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STATE BOARD
EXAMINATION QUESTIONS
— AND —
ANSWERS

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A VALUABLE GUIDE TO THE MEDICAL STUDENT
GIVING ACCURATE ANSWERS THAT WILL PROVE
HELPFUL IN PASSING STATE BOARD EXAMINA-
TIONS. REPRINTED FROM THE MEDICAL RECORD

EDITION OF 1908

Muslin, \$2.00 net

NEW YORK
WILLIAM WOOD & COMPANY

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By William Wood & Company

W. W. & Co.

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MEDICAL RECORD.

State Medical Licensing Boards.

STATE BOARD EXAMINATION QUESTIONS.*

ARKANSAS STATE BOARD OF MEDICAL EXAMINERS.

ANATOMY.

1. At what time in the development of the fetus is the hair formed?
2. Give the general classification of bones.
3. Name the bones of the upper extremity.
4. Describe the diaphragm, giving origin, insertion, nerve supply, and action.
5. Name the superficial group of the muscles of the abdomen.
6. Name the openings of the heart.
7. Name the branches of the anterior tibial artery.
8. Describe the pia-mater.
9. Describe the uterus.
10. Describe the gall-bladder.

PHYSIOLOGY.

1. Name and describe the glands of the intestines and tell in which portion of the intestine each kind is situated.
2. Describe the glycogenic function of the liver and tell the destination of glycogen.
3. Give origin, distribution, and function of the fifth pair of cranial nerves.
4. (a) How is the nervous system arranged anatomically? (b) Give a short sketch of each system.
5. How many pairs of spinal nerves are there? Describe them.

*It is proposed in this department to publish from time to time the examination papers of the various State Boards, in order that a candidate may become familiar with the character of the examination and so in some measure free himself in advance from the nervousness and dread which the unknown inspires. In furtherance of the same object answers to some of the questions will be published in order to show the candidate what the examiners expect of him. Not all the questions of all the papers will be so treated, for the answers to many, especially in the anatomical papers, are obvious or can be found in the index of any textbook on the subject; the answers to other questions, especially in the surgical papers, must sometimes be omitted because of the space they would demand. The candidate for a medical license will not find in these answers a short and easy road to success in the examination, for he is not likely to meet the same questions in the papers placed before him by the examiners. The object of publishing the questions and answers is only, as noted above, to acquaint the candidate with the general character of these examinations and to inspire him with confidence in the result of his trial.

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CHEMISTRY.

1. What is albumin?
2. In what form in nature do we find albumin in its purest form?
3. In what case of poisoning do we use albumin as an antidote?
4. Name a metallic poison for which albumin is especially recommended.
5. What is meant by toxicology?
6. What causes the decay of animal or vegetable matter when deprived of life?
7. What is meant by ptomain poison?
8. What is the origin of ptomain poison, or, in other words, how and from what are ptomains derived?
9. When the atmosphere we live in becomes charged with an excess of carbonic acid, how is it purified and made fit for the support of animal life?

MATERIA MEDICA AND THERAPEUTICS.

1. What is an alkaloid, a tincture, a fluid extract?
2. Name four different classes of medicine, with an example of each class. Give dose of example.
3. What drugs would you use hypodermatically to meet the following requirements? (a) To stimulate the heart's action; (b) to produce emesis; (c) to control hemorrhage.
4. What is the strength of normal salt solution? Give indications for its use and mode of administration.
5. Give principal alkaloid of belladonna and indications for its use; also dose.
6. Name the three (3) most used preparations of opium, and how much of each contains one grain of opium.
7. Give hypodermatic dose of the following: Sulphate of strychnine, sulphate of atropine, sulphate of morphine, apomorphin, hydrochlorate, nitroglycerin, and pilocarpine hydrochlorate.
8. Write a complete prescription for a diuretic containing not less than three ingredients.
9. How are the cathartic effects produced by salines?
10. How is nitrite of amyl used, and for what purpose?

PRACTICE.

1. Differentiate between acute alcoholism and apoplexy.
2. Give etiology, physical signs, and treatment of pericarditis.
3. Give physical signs of acute lobar pneumonia.
4. Give etiology, diagnosis, and treatment of biliary colic.
5. What are the two common complications of typhoid fever during the second or third week? and give treatment.

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6. Describe a case of acute catarrhal dysentery and give treatment.
7. Give etiology, diagnosis, and treatment of gonorrhea.
8. Give diagnosis and treatment of acute articular rheumatism.
9. Give etiology, morbid anatomy, period of measles incubation, common complications and their treatment.
10. Describe three stages of malarial paroxysm and give treatment in each stage.

SURGERY.

1. Describe symptoms and operation for gallstones.
2. Through what would you pass, in the open method of operating for hydrocele?
3. What are the contraindications for hemorrhoidal operation?
4. How would you differentiate between gallstones, gastric ulcer, and appendicitis?
5. Give surgical treatment for Bright's disease.

OBSTETRICS.

1. Describe the Fallopian tubes.
2. Describe the placenta and give its functions.
3. Give differential diagnosis of pregnancy from ovarian cystoma.
4. Give treatment for threatened abortion.
5. Write prescription for vaginitis.
6. Give treatment for placenta prævia.
7. What are the indications for vaginal tamponing?
8. Give method of performing cephalic version.
9. Give treatment of uterine inertia.
10. Give management of normal labor.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

ARKANSAS STATE BOARD OF MEDICAL EXAMINERS.

ANATOMY.

1. Hair begins to develop at about the third month of fetal life.

PHYSIOLOGY.

1. Lieberkühn's glands are found throughout the small and large intestine; Brunner's glands are found in the duodenum; the solitary glands are found throughout the entire intestine, but are most abundant in the lower part of

MEDICAL RECORD.

the ileum and the upper part of the large intestine; Peyer's patches are found in the lower two-thirds of the small intestine, chiefly in the ileum.

2. The destination of glycogen: It is converted into sugar (dextrose), is given off to the blood, and is finally oxidized in the tissues.

CHEMISTRY.

1. Albumin is a protein substance, found in most animal tissues, and consisting of carbon, hydrogen, oxygen, nitrogen, and sulphur. It is soluble in pure water, and is coagulated by heat.

2. In the white of hen's egg.

3. and 4. In mercurial poisoning (by corrosive sublimate), also in poisoning by nitrate of silver.

5. By toxicology is meant that branch of medical science which appertains to poisons; it includes their character, origin, actions, symptoms produced, antidotes, treatment, and detection.

6. The process of slow oxidation.

7. By ptomain poison is meant the poisonous products of putrefaction of dead animal tissues and fluids.

8. Ptomaines are derived from dead animal matter.

9. By the action of plants: the chlorophyll of which, under the influence of sunlight, decomposes the CO_2 into C and O_2 . The plants retain the carbon in organic combination, and return the oxygen to the air.

MATERIA MEDICA AND THERAPEUTICS.

1. An *alkaloid* is an organic, nitrogenized substance, alkaline in reaction, and capable of combining with acids to form salts in the same way that ammonia does. A *tincture* is an alcoholic solution of a nonvolatile substance. A *fluid extract* is a permanent solution of a vegetable drug, in which one cubic centimeter of the solution represents one gram of the drug.

2. (1) Emetics, as tartar emetic, dose one to two grains; (2) diuretics, as potassium acetate, dose five to sixty grains; (3) hypnotics, as chloral hydrate, dose five to twenty grains; (4) mydriatics, as atropine sulphate, dose one one-hundred-and-twentieth to one-twentieth of a grain.

3. To stimulate the heart's action, strychnine; to produce emesis, apomorphine; to control hemorrhage, ergot.

6. Pulvis ipecacuanhæ et opii, ten grains; tinctura opii, about ten minims; tincture opii camphorata, about half an ounce.

8. R Potassii acetatis

Potassii bitartratis

Potassii citratis.....āā ʒij

Aquæ destillatæ q.s.....ad ʒviiij. Misce.

MEDICAL RECORD.

Signa: One tablespoonful three times a day, in half a glass of water.

9. Salines cause a great increase in the amount of fluid secreted by the intestinal glands; they also hinder the re-absorption of this fluid. The result is an accumulation of fluid in the intestine, which, by distention, excites peristalsis.

SURGERY.

2. Skin, dartos, intercolumnar fascia, cremasteric fascia, infundibuliform fascia, and the parietal layer of the tunica vaginalis.

OBSTETRICS.

7. For controlling hemorrhage, either vaginal or uterine; to exert pressure; to support the uterus; as a means of applying medication locally; and for depleting inflammatory conditions.

STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS OF THE STATE OF CALIFORNIA.

ANATOMY.

1. Describe the relation of intra and extracranial veins, locating five principal emissary veins.

2. What segments of the spinal cord supply nerves to the abdominal viscera?

3. What muscles attach to the greater and lesser tuberosities of the humerus and what tendon passes between these tuberosities?

4. Describe the topographical anatomy of the elbow.

5. (a) What bones can be palpated along the inner border of the foot? (b) What ligament does the keystone of the longitudinal arch rest upon?

6. Indicate what vertebræ mark the level of the following: (a) umbilicus, (b) end of spinal cord, (c) inferior angles of the scapulæ, (d) central tendon of the diaphragm, (e) inferior border of the pleuræ.

7. Describe the arrangement of the superficial inguinal lymphatic glands and indicate from what structures they receive lymphatic vessels.

8. What arteries supply the following structures and what arteries are they branches of: (a) thyroid gland, (b) mammary gland, (c) uterus, (d) testicle, (e) great toe?

9. What nerves innervate the following: (a) muscles of mastication, (b) muscles of expression, (c) sterno-

MEDICAL RECORD.

cleido-mastoid, (d) muscles of the lingual region, (e) muscles of anterior femoral region, (f) skin on posterior surface of the thigh, (g) skin on inner surface of the arm, (h) skin over subcutaneous surface of the tibia, (i) tonsil, (j) meatus auditorius externus.

10. What are the relations and position of the pancreas?

HISTOLOGY.

1. Describe the histological structures and their relation to each other in a cross-section of the wall of the duodenum.

2. Describe the histological structure of the testes.

3. Describe the histological structure of a typical lymphatic gland.

4. Name the histological structures found in the eyelid.

5. Draw a diagram of a cross-section of a nerve trunk showing histological structures.

6. Describe the histological structure of the pancreas.

7. Describe the histological structure of the wall of the ureters.

8. Identify two specimens.

9. Identify two specimens.

10. Identify two specimens.

PHYSIOLOGY.

1. Discuss briefly the subject of animal heat.

2. Describe in detail the digestion of carbohydrates.

3. (a) Explain the production of the apex beat of the heart. (b) Give the cardiac nerve supply.

4. (a) In what regions of the chest may bronchial breathing be normally heard? (b) What is meant by Cheyne-Stokes respiration?

5. What is the physiological reason that the head, upper extremities, and abdomen are relatively larger in the new-born than in the adult?

6. (a) Give the specific gravity, chemical reaction, and the normal constituents of human urine. (b) Average quantity in 24 hours.

7. Give the distribution and function of the fourth cranial nerve.

8. Distinguish between cerebral and spinal paralyses in (a) Muscle tonus. (b) Nutrition of muscles. (c) Electrical reactions of muscles.

9. Where are the following centers: (a) Parturition, (b) auditory, (c) respiratory, (d) visual, (e) micturition.

10. Define: (a) Amnion, (b) corpus luteum, (c) myopia, (d) leucin, (e) eupnea, (f) erythrocyte, (g) hemolysin, (h) neuron, (i) dialysis, (j) lipase.

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CHEMISTRY AND TOXICOLOGY.

1. Define (a) elements, (b) compounds, (c) synthesis, (d) analysis.
2. (a) Name and give formulæ of the compounds of nitrogen and hydrogen. (b) What two important elements found in the blood?
3. (a) In what is human milk richer than cows' milk? (b) In what poorer? (c) State the difference between egg albumin and serum albumin.
4. (a) Of what significance are hemin crystals? (b) What is the composition of hemoglobin?
5. (a) Injury to what principal organs would cause glycosuria? (b) Describe the chemistry of the stomach.
6. (a) What are carbohydrates? (b) What is the fat splitting ferment of the pancreatic juice? (c) Name five classes of proteids.
7. (a) Describe a quantitative test for sugar in the urine. (b) Give test for bile pigment in the urine. (c) What is the normal amount of urea excreted by the male in 24 hours?
8. Give classification of poisons with example of each.
9. (a) Describe Marsh's test for arsenic. (b) Is the quantity of saliva increased or decreased by mineral acids?
10. Symptoms: Intense burning pains from mouth to stomach, nausea, vomiting, diarrhea with bloody stools and swelling of the abdomen, lips and tongue white and shriveled, death in two days from collapse, crystalline substance found in the stomach. White, soluble in water and gives black precipitate with H_2S . Name the poison and state what should have been the antidote.

BACTERIOLOGY.

1. Describe briefly and clearly the manufacture of serum agar. (a) State the sources of serum that may be used for this purpose. (b) Name three organisms to whose growth it is an essential.
2. Given a bacterial invasion, state exactly and in order the steps taken to prepare an homologous vaccine, including the standardization of same.
3. State the technique of a bacterial examination of milk. (a) What pathogenic organisms may be found? (b) How would you estimate the number per c.c.
4. What is tuberculin? (a) Name three varieties. (b) Describe Calmette's reaction.
5. Describe the organism of erysipelas. (a) How would you differentiate it from members of the same group?
6. Describe the gonococcus. (a) What organisms may be mistaken for the gonococcus? (b) Differentiate each.

MEDICAL RECORD.

7. Differentiate between pathogenic and nonpathogenic organisms. (a) Give four examples of each.
8. Describe the bacillus of tetanus. (a) Give its common habitat. (b) Name three toxins due to it.
9. Examination of two slides.
10. Examination of two slides.

PATHOLOGY.

1. In what disease conditions do we find acetonuria? Name the chemical bodies allied to acetone.
2. What conditions may produce a recrudescence fever in typhoid?
3. In tuberculous peritonitis, what are the sources of infection? What may be the postmortem appearance?
4. Describe the cerebrospinal fluid in epidemic meningitis; what are the portals of infection; and what is the gross pathology?
5. What are the causes of endarteritis; describe the successive microscopic stages; what changes in the brain may result from arteriosclerosis?
6. Name in the order of frequency the different lesions that may result from a gonococcus infection of the female genitourinary tract.
7. What are the typical anatomical findings, post mortem, in puerperal eclampsia?
8. Discuss the theories of the etiology of cancer.
9. Microscopic specimens.
10. Gross pathological specimens.

GENERAL DIAGNOSIS.

1. Differentiate cerebral hemorrhage, embolism, and thrombosis.
2. Describe bone lesions of syphilis.
3. Describe talipes equinus.
4. Describe uncinariasis.
5. Differentiate pyelitis and pyelonephritis.
6. Differentiate variola, varicella, r  theln, and scarlet fever.
7. Differentiate dislocation of the head of the femur from fracture of its neck.
8. Discuss thoracic aneurysm.
9. Differentiate inguinal hernia and enlarged inguinal gland.
10. Describe psoriasis.

OBSTETRICS.

1. (a) Describe the changes that take place in the mucous lining of the uterus preparing it for the reception of the fertilized ovum. (b) If it becomes attached what

MEDICAL RECORD.

further changes take place? (c) If it passes without becoming attached what further changes occur?

2. At what period of pregnancy is an abortion or miscarriage most dangerous, and explain fully why.

3. Describe the conditions most likely to result in laceration of the cervix, and what remedies would you use, or what treatment would you employ to reduce the danger as much as possible?

4. Describe the clinical symptoms that would lead you to suspect tubal pregnancy during the early months of gestation.

5. Name five diseases that may be transmitted to the fetus *in utero*.

6. Describe fully how you would conduct a face presentation.

7. In breech presentations: (a) Are they more dangerous to the mother? If so, why? (b) Are they more dangerous to the child? If so, why? (c) Describe how you would conduct them to decrease the danger to either as much as possible.

8. Name ten drugs the mother should be instructed to avoid during lactation, and state fully how they endanger either the mother or child.

9. Describe fully the difference in the conditions calling for the use of oxytocics, and those calling for forceps.

10. Describe the conditions which would lead you to fear impending rupture of the uterus, and what would you do to prevent it?

GYNECOLOGY.

1. Give five causes of amenorrhea.

2. Give five causes of metrorrhagia.

3. Differentiate briefly between: pyosalpinx, tubal pregnancy, and parovarian cyst.

4. Differentiate briefly between: labial hematoma, labial hernia, labial hydrocele of the round ligament, and labial abscess.

5. Differentiate briefly between: hematosalpinx, hematometra, and hematocolpometra.

6. What is a rectocele, its most common cause and its treatment?

7. Give treatment of retroversion of the uterus in a severe case. Outline the operation.

8. Give a good reason for circumcising a woman and describe the operation.

9. What are the positions of the uterus in the three stages of prolapse?

10. Give diagnosis and treatment of urethral caruncle.

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7. Differentiate between pathogenic and non-pathogenic organisms. (a) Give four examples of pathogenic organisms. (b) Name three toxins due to pathogenic organisms.
8. Describe the bacillus of tetanus. (a) Name its common habitat. (b) Name three toxins due to it.
9. Examination of two slides.
10. Examination of two slides.

PATHOLOGY.

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4. Describe the cerebrospinal fluid in epidermatitis; what are the portals of infection; and the gross pathology?
5. What are the causes of endarteritis? Name the successive microscopic stages; what changes may result from arteriosclerosis?
6. Name in the order of frequency the diseases that may result from a gonococcus infection of the genitourinary tract.
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8. Discuss the theories of the etiology of eclampsia.
9. Microscopic specimens.
10. Gross pathological specimens.

GENERAL DIAGNOSIS.

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2. Describe bone lesions of syphilis.
3. Describe talipes equinus.
4. Describe uncinariasis.
5. Differentiate pyelitis and pyelonephritis.
6. Differentiate variola, varicella, r  theln, and measles.
7. Differentiate dislocation of the head of the femur from fracture of its neck.
8. Discuss thoracic aneurysm.
9. Differentiate inguinal hernia and enlarged lymphatic gland.
10. Describe psoriasis.

OBSTETRICS.

1. (a) Describe the changes that take place in the mucous lining of the uterus preparing it for the reception of the fertilized ovum. (b) If it becomes attached, describe the changes.

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guinal lymphatic glands are grouped
of Poupart's ligament; they are flat-
oe, and about half a dozen in num-

ic vessels from: part of the thigh,
is and scrotum or vulva, and from
s of the abdomen below the um-

<i>Supply.</i>	<i>Branch of.</i>
or thyroid.	1. External carotid.
or thyroid.	2. Thyroid axis.
de ima	3. Innominate, or
(et times).	arch of aorta.
ting	1. Internal mam-
es.	mary.
oracic.	2. Axillary.
inter-	3. Internal mam-
	mary.
als.	4. Thoracic aorta.
	1. Internal iliac.
	2. Abdominal
	aorta.
	1. Abdominal
	aorta.
	2. Superior vesical.
rens	
(es).	
als.	1. Dorsalis hal-
	lucis.
lucis.	2. Communicating
	of dorsalis
	pedis.

Innervated

- () Inferior ma
- vision of
- () Facial.
- () Spinal access
- Hypoglossal.

Anterior crura

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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS OF THE STATE OF CALIFORNIA.

ANATOMY.

1. The *extracranial* veins are found in the superficial fascia above the aponeurosis. They communicate with the *intracranial* venous sinuses of the dura in several ways: (1) By the emissary veins; (2) by the angular and supra-orbital veins anastomosing with the ophthalmic vein, which opens into the cavernous sinus; (3) by the diploic veins.

Five principal emissary veins: (1) A vein passing through the mastoid foramen, connecting the lateral sinus with the occipital and posterior auricular veins; (2) a vein passing through the foramen cecum, connecting the superior longitudinal sinus with the mucous membrane of the nose; (3) a vein passing through the parietal foramen, connecting the superior longitudinal sinus with the veins of the scalp; (4) a vein passing through the posterior condyloid foramen, connecting the lateral sinus with the deep veins of the neck; (5) small veins passing through the foramen ovale, connecting the cavernous sinus with the pharyngeal and pterygoid veins.

2. The abdominal viscera receive their nerve supply from the sixth dorsal to the first lumbar segment of the spinal cord.

3. To the greater tuberosity of the humerus are attached: Supraspinatus, infraspinatus, and teres minor muscles. To the lesser tuberosity is attached the subscapularis. Between these tuberosities there passes the long tendon of the biceps.

5. (a) The bones that can be palpated along the inner border of the foot are: Os calcis, internal malleolus, scaphoid, internal cuneiform, first metatarsal, sesamoid bones of the great toe.

(b) The astragalus is the keystone of the longitudinal arch of the foot, and it rests upon the inferior calcaneo-scaphoid ligament.

6. (a) The *umbilicus* is opposite the fibrocartilaginous disc between the third and fourth lumbar vertebrae.

(b) The *end of the spinal cord* is opposite the lower edge of the body of the first lumbar vertebra.

(c) The *inferior angles of the scapulae* are opposite the spine of the seventh dorsal vertebra.

(d) The *central tendon of the diaphragm* is opposite the spine of the eighth dorsal vertebra.

(e) The *inferior border of the pleurae* is opposite the spine of the twelfth dorsal vertebra.

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7. The superficial inguinal lymphatic glands are grouped along the lower edge of Poupart's ligament; they are flattened and ovoid in shape, and about half a dozen in number.

They receive lymphatic vessels from: part of the thigh, the buttock, skin of penis and scrotum or vulva, and from the superficial lymphatics of the abdomen below the umbilicus.

8.

	<i>Arterial Supply.</i>	<i>Branch of.</i>
(a) Thyroid gland....	1. Superior thyroid. 2. Inferior thyroid. 3. Thyroidea ima (sometimes).	1. External carotid. 2. Thyroid axis. 3. Innominate, or arch of aorta.
(b) Mammary gland....	1. Perforating branches. 2. Long thoracic. 3. Anterior intercostals. 4. Intercostals.	1. Internal mammary. 2. Axillary. 3. Internal mammary. 4. Thoracic aorta.
(c) Uterus....	1. Uterine. 2. Ovarian.	1. Internal iliac. 2. Abdominal aorta.
(d) Testicle...	1. Spermatic. 2. Artery of vas deferens (sometimes).	1. Abdominal aorta. 2. Superior vesical.
(e) Great toe..	1. Dorsal digitals. 2. Princeps hallucis.	1. Dorsalis hallucis. 2. Communicating of dorsalis pedis.

9.

	<i>Innervated by—</i>
(a) Muscles of mastication.	(a) Inferior maxillary division of trigeminus.
(b) Muscles of expression.	(b) Facial.
(c) Sterno-cleido-mastoid..	(c) Spinal accessory.
(d) Muscles of lingual region.....	(d) Hypoglossal.
(e) Muscles of anterior	(e) Anterior crural.

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	<i>Innervated by—</i>
femoral region.....	
(f) Skin on posterior surface of thigh.....	(f) Small sciatic and external cutaneous.
(g) Skin on inner surface of arm.....	(g) Internal cutaneous and lesser internal cutaneous.
(h) Skin over subcutaneous surface of tibia.	(h) Internal saphenous.
(i) Tonsil.....	(i) Glossopharyngeal and vagus.
(j) Meatus auditorius externus.....	(j) Inferior maxillary division of trigeminus, and vagus.

HISTOLOGY.

4. The histological structures found in the eyelid are: Skin, areolar tissue, orbicularis palpebrarum, palpebral ligament, levator palpebræ, tarsal cartilage, Meibomian glands, lashes, sebaceous follicles, and conjunctiva.

PHYSIOLOGY.

1. The heat of the body varies very little in health; it is maintained at a temperature of about 98° to 99° F.

The heat of the body is *maintained* by the thermotactic centers in the brain and cord keeping an equilibrium between the heat gained or produced in the body and the heat lost. Heat is *gained* to the body by (1) the muscles, during contraction; (2) the secreting glands; (3) the brain, during mental activity; and (4) by the ingestion of food and hot liquids.

Heat is *lost* to the body by (1) the skin, through evaporation, radiation, and conduction; (2) the lungs; and (3) the excretions (feces and urine).

4. (a) *Bronchial breathing* is normally heard over the trachea, just above the suprasternal notch, also over the primary bronchi.

(b) *Cheyne-Stokes respiration* is a condition in which the respirations gradually increase in volume and rapidity until they reach a climax, when they gradually subside, and finally cease for from ten to forty seconds, when the same cycle begins again.

5. The head, upper extremities, and abdomen are relatively larger in the new-born child than in the adult, because: (1) Most of the blood of the umbilical vein goes through the liver before reaching the inferior vena cava; (2) most of the pure blood is distributed by the branches

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of the arch of the aorta to the head and upper extremities. The better blood supply of these parts causes their better growth and development.

6. (a) The specific gravity of normal urine is from about 1015 to 1025; its chemical reaction is acid. The normal constituents of urine are: Water urea, uric acid, urates, hippuric acid, kreatinin, xanthin, hypoxanthin; sulphates, chlorides, and phosphates of sodium and potassium; phosphates of magnesium and calcium; nitrogen and carbon dioxide.

(b) The average quantity voided in 24 hours is about fifty ounces.

7. The fourth cranial nerve is distributed to the superior oblique muscle of the eye; it is the motor nerve of this muscle.

8.

	<i>Cerebral Paralysis.</i>	<i>Spinal Paralysis.</i>
(a) Muscle tonus.	Spastic; may be contractures.	Flaccid.
(b) Nutrition of muscle.....	Normal, or slight atrophy.	Marked atrophy.
(c) Electrical reaction.....	Normal.	Little or no response to faradic current; partial or complete reaction of degeneration to galvanic current.

9. (a) The center for parturition is in the lumbar region of the spinal cord; (b) auditory center is in the superior temporosphenoidal convolution of the cerebrum; (c) respiratory center is in the floor of the fourth ventricle; (d) visual center is in the occipital lobe; (e) center for micturition is in the lumbar region of the spinal cord.

10. (a) *Amnion* is the innermost of the fetal membranes.

(b) *Corpus luteum* is a yellow body found in the ovary at the site where a Graafian follicle has discharged its ovum.

(c) *Myopia* is a condition in which the anteroposterior axis of the eye is abnormally long, and parallel rays are focused in front of the retina.

(d) *Leucin* is a crystalline substance found in several tissues of the body; in the liver it is converted into urea; it is also found in the urine; its chemical name is amidocaproic acid.

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- (e) *Eupnea* is easy or normal respiration.
(f) *Erythrocyte* is a red or colored blood corpuscle.
(g) *Hemolysin* is "a substance produced in the body of one species of animal by the introduction of red blood-corpuscles derived from the body of another species. It is capable of dissolving the red blood-corpuscles of the animal species from which the blood was obtained." (Gould.)
(h) *Neuron* is the unit of the nervous system; it consists of a nerve-cell with its processes and terminations.
(i) *Dialysis* is the process of separating substances from a mixture by placing the latter in a vessel with porous walls and immersing it in water, when the more diffusible substance passes through the porous wall.
(j) *Lipase* is a fat-splitting enzyme, found in the pancreatic juice and elsewhere; it has a reversible action.

CHEMISTRY AND TOXICOLOGY.

1. (a) *Elements* are substances which cannot, by any known means, be split up into two or more other kinds of substance.

(b) *Compounds* are substances made up of two or more elements chemically united, in definite proportions.

(c) *Synthesis* is the formation of compounds from elements or from simpler compounds.

(d) *Analysis* is the decomposition of a compound into simpler compounds or into elements.

2. (a) Compounds of Nitrogen and Hydrogen: Ammonia, NH_3 ; Hydrazine, N_2H_4 ; and Hydrazoic Acid, N_3H .

(b) Two important elements found in the blood: Oxygen and carbon.

3. (a) Human milk is richer than cow's milk in sugar.

(b) Human milk is poorer than cow's milk in proteids.

(c) "There are four distinct points of difference between the egg and the serum albumins: (1) Egg albumin is rapidly coagulated by alcohol; serum albumin but slowly. (2) Egg albumin is coagulated by ether; serum albumin is insoluble in ether, but is not actually coagulated. (3) Egg albumin is less soluble than serum albumin in nitric and in hydrochloric acids. (4) If egg albumin is injected into the circulation, or even if very large quantities of it are taken into the stomach, some of it may be excreted, apparently unchanged, in the urine, even in healthy individuals. This is not the case with serum albumin." (*Pellew's Manual of Chemistry*.)

4. (a) Hemin crystals are an absolute indication of the presence of blood-pigment.

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(b) Hemoglobin is composed of the following elements: Carbon, hydrogen, oxygen, nitrogen, sulphur, and iron.

5. (a) *Permanent glycosuria* can be produced by injury to the floor of the fourth ventricle of the brain.

Transitory glycosuria has been observed after injury to the liver, the nervous system, and the cervical vertebrae.

6. (a) *Carbohydrates* were formerly defined as substances of unknown constitution, composed of carbon, hydrogen, and oxygen, the last two being in the proportion to form water.

(b) The fat-splitting ferment of the pancreatic juice is Steapsin.

(c) Five classes of proteids. Albumins, Globulins, Coagulated proteids, Derived proteids, and Proteoses.

7. (a) Method for the *quantitative estimation of sugar in urine: Fehling's method*: The solution is made as follows:

- | | |
|---|-------------|
| I. Dissolve cupric sulphate | 51.98 gm. |
| in water to | 500.00 c.c. |
| II. Dissolve Rochelle salt | 259.9 gm. |
| in sodium hydroxide soln. sp. gr. 1.12 to 1,000 c.c. (Piffard.) | |

When required for use, one volume of I. is to be mixed with two volumes of II. The copper contained in 10 c.c. of this mixture is precipitated completely, as cuprous oxide, by 0.05 gm. of glucose.

"To determine the quantity of sugar, place 10 c.c. of the mixed soln. in a flask of about 250 c.c. capacity, dilute with H₂O to about 30 c.c., and heat to boiling. On the other hand, the urine to be tested is diluted and thoroughly mixed with four volumes of H₂O if it be poor in sugar, or with nine volumes of H₂O if highly saccharine, and a burette filled with the mixture. When the Fehling soln. boils, add a few gtt. NH₄HO and then 5 c.c. of the urine from the burette, boil again, and continue the alternate addition of diluted urine and boiling of the mixture until the blue color is quite faint. Now add the diluted urine in quantities of 1 c.c. at a time, boiling after each addition until the blue color just disappears. Have ready a small filter, and, having filtered through it a few gtt. of the hot mixture, acidulate the filtrate with acetic acid, and add to it 1 gtt. soln. of potassium ferrocyanide. If a brownish tinge be produced, add another ½ c.c. of dil. urine to the flask, boil, and test with ferrocyanide as before. Continue this proceeding until no brown tinge is produced. The burette reading, taken at this point, gives the number of c.c. of dilute urine containing 0.05 gm. glucose, and this divided by 5 or 10, according as the urine was diluted with 4 or 9 volumes of H₂O, gives the number of c.c. of urine contain-

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ing 0.05 gm. sugar. The number of c.c. urine passed in twenty-four hours divided by 20 times the number of c.c. containing 0.05 gm. glucose, gives the elimination of glucose in twenty-four hours in grams.

Example: Urine in 24 hours	= 2,436 c.c.
Fehling's soln. used	= 10 c.c.
Urine diluted with 4 vols. H ₂ O	
Burette reading	= 18.5 c.c.

18.5
 $\frac{\quad}{\quad} = 3.7 = \text{c.c. urine containing 0.05 gm. glucose.}$

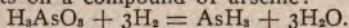
5
 2,436
 $\frac{\quad}{3.7 \times 20} = 32.92 = \text{grams glucose eliminated in 24 hours.}''$
 (Witthaus' *Urinalysis*.)

(b) *Test for bile pigment in the urine:* Put 3 c.c. HNO₃ in a test tube, add a piece of wood, and heat until the acid is yellow; cool. When cold, float some of the urine to be tested upon the surface of the acid. A green band is formed at the junction of the liquid, which gradually rises, and is succeeded from below by blue, reddish-violet, and yellow.

(c) The normal amount of urea excreted by a male in twenty-four hours is about an ounce to an ounce and a half.

8. Poisons may be classified as: 1. Mineral poisons, as arsenic; 2. Vegetable poisons, as oxalic acid; 3. Animal poisons, as ptomains; 4. Synthetic poisons, as chloral.

9. (a) *Marsh's test for Arsenic:* This test depends on the fact that arsenic hydride is formed when nascent hydrogen acts on a compound of arsenic:



A small flask fitted with thistle funnel and a delivery tube, as for the production of hydrogen, is used; pure zinc and hydrochloric acid are introduced, and after a short time the hydrogen is ignited. It is advisable to cover the flask with a cloth before igniting the gas, as an explosion may happen unless the air has all been driven out. If the materials are pure the hydrogen flame gives no deposit upon a piece of cold porcelain brought into it, but commercial zinc usually contains arsenic. When the purity of the gas is proved, a little solution of arsenite may be poured down the thistle funnel, which will produce a more rapid evolution of gas, and the flame will become larger and perceptibly colored. A piece of cold porcelain depressed upon the flame will be covered with a deposit of metallic arsenic. The films of arsenic are metallic looking in the thicker places, brownish near the edges; they are easily volatilized by heat, and dissolve in solution of bleaching powder. A portion of the glass tube

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from which the gas is burnt should be heated to redness; the gas decomposes, and a deposit of arsenic appears on the tube, which may be identified in a similar way, or may be converted into crystals of oxide by cautious sublimation in an open tube. (Fisher's *Elementary Chemistry*.)

(b) The quantity of saliva is increased by mineral acids.

10. The symptoms given probably indicate poisoning by corrosive sublimate.

The antidote is white of egg in not too large a quantity, followed by an emetic.

PATHOLOGY.

1. *Acetonuria* is found in the following diseased conditions: Diabetes, prolonged fevers, puerperal eclampsia, pernicious vomiting of pregnancy, after chloroform anesthesia, carcinoma, inanition and wasting diseases, general paresis, melancholia, and epilepsy.

The chemical bodies allied to acetone are: Beta-oxy-butyric acid, and diacetic acid.

2. The following conditions may produce a recrudescent fever in typhoid: Errors in diet, nervous excitement, and occasionally malaria.

3. In tuberculous peritonitis, *the sources of infection* are: The blood, the intestines, mesentery, Fallopian tubes, uterus, prostate, and epididymis.

The post-mortem appearances: Numerous tubercles in patches, or over the whole surface of the peritoneum, which is hyperemic; the omentum and mesentery are apt to be involved, and become thickened; there is an exudate, which may be serous, serofibrinous, or hemorrhagic; adhesions are often present, in chronic cases. The tubercles are yellowish or opaque, and may undergo caseation or suppuration.

4. In epidemic meningitis, the cerebrospinal fluid is apt to be turbid, may be bloody, and contains pus and the *Diplococcus intracellularis meningitidis*; pneumonia diplococci, and other bacteria, chiefly streptococci and the vari-ous staphylococci, have also been found.

The portal of infection is probably the nose, by inhalation.

Gross pathology: "The skull and dura mater are often abnormally vascular; the cerebral sinuses are much distended with blood. All the membranes of the brain are more or less congested; the arachnoid especially is vascular and opaque from inflammatory exudation—this opacity varies from slight milkiness to thick and dense deposits. The characteristic lesion is the whitish or greenish-yellow fibrinopurulent deposit found at the base of the brain; in many cases, however, it is not limited to the

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base, but extends up along the sulci to the vertex. This deposit varies somewhat with the duration of the disease; in cases which have lasted a week or two, it is abundant, yellowish or greenish; and the origins of the nerves seem to be buried in and compressed by the exudation. The brain substance itself is more vascular than normal, and there is some inflammatory infiltration of its superficial layers. The ventricles in the more acute cases contain turbid fluid, in the more prolonged they may be much distended by excess of clear cerebrospinal fluid. In the spinal cord the lesions are similar to those found in the brain and its membranes." (Quain's *Dictionary of Medicine*.)

6. As a result of gonococcus infection, a woman may suffer from: Urethritis, endocervicitis, vulvitis, infection of Bartholin's glands, vaginitis, endometritis, salpingitis, ovaritis, peritonitis, sterility, cystitis, proctitis.

7. In puerperal eclampsia, there may be found: The cortex of the kidney is pale and swollen, the epithelium shows cloudy swelling, degeneration, or necrosis; the ureters may be dilated; the liver is of normal size or smaller, and shows fatty degeneration and increase of connective tissue; hemorrhages and infarcts, due to embolism or thrombosis, may also be present; the spleen shows changes similar to those in the liver.

GENERAL DIAGNOSIS.

1. "*Cerebral hemorrhage* occurs after the age of fifty-five, as a rule, with atheromatous arteries and an hypertrophied heart. The onset is sudden, with coma, during exertion or excitement. The temperature falls in an hour, and then rises, sometimes to 106°. Gradual recovery of consciousness takes place in from three to five days, with permanent hemiplegia.

"*Cerebral embolism* comes at any age, with heart disease or after childbirth. There is a sudden onset, without loss of consciousness or with slight mental confusion, or with rapid return to consciousness. The temperature does not fall, but may rise as high as 102°. Improvement occurs within twenty-four hours to a marked degree, but after three or four days the symptoms return. Monoplegia, hemiplegia, or aphasia may remain. Jacksonian epilepsy may develop if the lesion is cortical, involving a special center.

"*Cerebral thrombosis* occurs at any age, but chiefly in syphilitic persons and middle-aged men. There are usually premonitions. The onset is slower, without coma, but with dullness of the mind. The temperature does not fall, but may rise to 100°. The paralysis is similar to that observed in embolism.

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"The diagnosis between these three conditions is hardly ever positive." (Caillé's *Differential Diagnosis*.)

9. In *Inguinal hernia*: there will be an impulse on coughing, it may be reducible, percussion will give a clear note if the hernia contains intestine, and it will feel like intestine or omentum (knotty).

Enlarged Inguinal gland: no impulse on coughing, will not be reducible, dull on percussion, and is hard and well defined.

GYNECOLOGY.

2. Five causes of metrorrhagia: Cancer of uterus, chronic metritis, fibroids, polypi, inversion of uterus.

5. In atresia of the vaginal orifice, when the menstrual blood collects in the vagina and cervix, the condition is called *Hematocolpometra*; when blood collects in the body of the uterus, it is called *Hematometra*; when blood collects in the tubes, it is called *Hematosalpinx*.

9. In the *first* degree of prolapse, the cervix rests upon the floor of the pelvis; in the *second*, the cervix appears at the vulvar orifice; and in the *third* degree, the uterus is entirely outside the vulva.

10. *Urethral caruncle* is a small red fleshy growth generally situated on the posterior part of the meatus of the urethra. There are local pain and tenderness, which may be excessive; a burning sensation is experienced on urination; it may bleed. The proper treatment is to excise it or destroy it with a thermocautery.

STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS. STATE OF COLORADO.

TOXICOLOGY.

1. Give symptoms and treatment of chronic poisoning by acetanilid.

2. Name two antidotes to carbolic acid poisoning, and state mode of action of each.

3. Give symptoms of an overdose of wood alcohol.

4. State the toxic effects of the local use of iodoform.

5. Discuss the symptoms and treatment of a patient with mercurial ptyalism or salivation.

6. Mention the treatment of a case of strychnine poisoning.

7. Give symptoms of poisoning by atropine.

8. Name the symptoms of too long continued administration of Fowler's solution.

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9. Treatment of an acute case of lead poisoning.
10. Give the symptoms and treatment of poisoning by aconite.

CHEMISTRY.

1. Define (a) analysis, (b) synthesis.
2. What are (a) bases, (b) acids, (c) salts.
3. Give the preparation and properties of HNO_3 .
4. Name the standards based on water.
5. Illustrate why a salt of mercury is incompatible with potassium iodide.
6. What do you understand by carbohydrates?
7. Proteins are compounds of what?
8. How is glycerin prepared?
9. How would you test the gastric contents for morphine?
10. Give a test for indican in urine.

PHYSIOLOGY.

1. Define the science of physiology.
2. Define the terms metabolism, anabolism, and catabolism.
3. Name the digestive ferments, giving origin and function of each.
4. Name the eliminative organs of the body, and tell what is eliminated by each.
5. Define the purpose, chemistry, and mechanism of respiration.
6. What are the functions of the lymphatic system?
7. Define a reflex arc.
8. Give the amount of urine passed per diem by an adult, together with the normal color, reaction, and constituents.
9. How may the amount of urine be physiologically increased or diminished?
10. Give the functions of the skin.

ANATOMY.

1. Give brief description of the vascular anatomy of the arm and forearm.
2. What is the origin of the ovarian arteries?
3. What does the pudic artery supply?
4. Bound Scarpa's triangle.
5. Name the different kinds of joints, giving examples of each.
6. What anatomical structures are divided in making a McBurney incision?
7. What is the nerve supply of the flexor group of muscles of the forearm?
8. What is the origin of the spermatic arteries?

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9. What is the origin and insertion of the sartorius muscle?
10. What muscles are attached to the greater trochanter of the femur?

PATHOLOGY.

1. Define pathology.
2. Give the pathological lesions which may result from syphilitic or rheumatic iritis.
3. Define osteomyelitis, and give cause of same.
4. How would you recognize cerebrospinal fluid, and how would you test it in tuberculous meningitis?
5. Give a cause and pathology of pulmonary edema.
6. (a) What is necrosis? (b) What prevents hemorrhage in gangrenous lesions?
7. What is thrombosis?
8. Give pathology of smallpox.
9. What diseases produce albumin in the urine?
10. Give pathology of lobar pneumonia.

SYMPTOMATOLOGY.

1. Differentiate between tenia solium and tenia medio-canellata, and describe the symptoms which they produce.
2. Give the causes and symptoms of acute intestinal obstruction.
3. Describe the symptoms and conditions that may be observed in a case of sunstroke.
4. Give symptomatology, diagnosis, and prognosis of chronic lead poisoning.
5. Give the symptoms and physical signs of aortic stenosis and mitral regurgitation.
6. Describe symptoms and course of acute lobar pneumonia. Differentiate between lobar and bronchopneumonia.
7. Give the causes, symptoms, diagnosis, and prognosis of acute nephritis.
8. Give the symptoms and diagnosis of renal calculus.
9. Give etiology, symptomatology, diagnosis, and prognosis of arthritis deformans.
10. Give the causes, symptoms, diagnosis, and prognosis of leukemia.

SURGERY.

1. Give the etiology and symptoms of erysipelas.
2. What are the symptoms and treatment of tuberculous peritonitis?
3. Describe a subphrenic abscess, and give the causes and symptoms.
4. Give the early symptoms of hip-joint disease.
5. Give the symptoms and cause of hypertrophy of the prostate gland.
6. What is leucocytosis, and its value in surgery?

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7. What are the symptoms of fracture of the internal condyle of the humerus, and mention a deformity that may follow.
8. Give differential diagnosis between malignant and benign tumors.
9. What is the cause of dry gangrene?
10. Give differential diagnosis between synovitis of knee-joint and housemaid's knee.

OBSTETRICS.

1. (a) What is pregnancy? (b) What is fecundation? (c) What changes take place in the ovum after fecundation?
2. (a) What is the funis? (b) What are the dimensions of the placenta and funis at full term?
3. (a) What is extrauterine pregnancy? (b) Give the symptoms. (c) Give the diagnosis.
4. (a) What is hydatid pregnancy? (b) What are its symptoms and termination?
5. What are the causes of albuminuria and edema?
6. (a) What is labor? (b) How many stages is it divided into? (c) What is the best method of delivering the placenta?
7. How may a child be resuscitated when apparently stillborn?
8. What is meant by "mechanism of labor"?
9. What forms of hemorrhage are met with before, during, or after labor, and treatment of each?
10. (a) What are the causes of rupture of the uterus? (b) What are the symptoms and what treatment is indicated?

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS, STATE OF COLORADO.

TOXICOLOGY.

1. Chronic poisoning by acetanilid may give rise to decrease in the number of red blood cells; the face is livid and covered with perspiration, the respirations become slow and shallow, the pulse soft, compressible, and gradually weaker.

Treatment: Stop further administration of the drug, then support the patient by stimulants, warmth, and strychnine.

2. The chemical antidotes to carbolic acid are the

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soluble sulphates, such as magnesium or sodium sulphate. With the carbolic acid these salts form insoluble sulphocarbates.

Milk or white of egg is also an antidote, and acts as such by combining with the carbolic acid to form insoluble or nearly insoluble compounds.

3. Symptoms of an overdose of wood alcohol are: Nausea, vomiting, headache, vertigo, dilated pupils, profuse sweating, delirium, coma, and partial or complete blindness.

4. The toxic effects of the local use of iodoform are: Redness, pain, swelling, fever, eruption, general malaise, headache, vertigo, depression of spirits, delusions, mania, drowsiness, coma, death.

5. Symptoms of mercurial ptyalism or salivation are: Profuse secretion of saliva, fetid breath, spongy and tender gums, tender and swollen tongue and salivary glands, there may be a blue line on the gums near the teeth, and the teeth may become loosened; there may be nausea, vomiting, diarrhea, cachexia, and collapse.

Treatment consists in removing the patient from the influence of mercury; mouth washes of potassium chlorate or borax, hot baths, mild purgatives and diuretics, potassium iodide, general tonics, and proper hygiene are all indicated.

6. *Treatment of strychnine poisoning*: "The convulsions are to be arrested or mitigated by bringing the patient under the influence of chloral or chloroform as rapidly as possible; the stomach is to be washed out, and the patient is to be kept as quiet as possible." (Witthaus' *Essentials of Chemistry*.)

7. *Symptoms of poisoning by atropine*: Dryness of the mouth and throat, thirst, drowsiness, dysphagia, face flushed, pupils much dilated, eyes prominent, numbness and partial paralysis of the extremities, and there may be delirium and coma.

8. *Symptoms of too long continued administration of Fowler's solution* are: Puffiness of the eyelids, diarrhea, colic, and general abdominal pain, erythema, and possibly neuritis and paralysis.

9. *Treatment of acute lead poisoning* consists in removing the cause and administering the antidote, "magnesium sulphate, which brings about the formation of the insoluble lead sulphate, while the purgative action of the magnesia is also useful. It should be preceded by an emetic, or by the use of the stomach tube." (Witthaus' *Essentials of Chemistry*.)

10. POISONING BY ACONITE: "The symptoms usually manifest themselves within a few minutes; sometimes

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are delayed for an hour. There is numbness and tingling, first of the mouth and fauces, later becoming general. There is a sense of dryness and of constriction in the throat. Persistent vomiting usually occurs, but is absent in some cases. There is diminished sensibility, with numbness, great muscular feebleness, giddiness, loss of speech, irregularity and failure of the heart's action. Death may result from shock if a large dose of the alkaloid be taken, but more usually it is by syncope.

"The treatment should be directed to the removal of unabsorbed poison by the stomach pump, and washing out of the stomach with infusion of tea holding powdered charcoal in suspension. Stimulants should be freely administered." (Witthaus' *Essentials of Chemistry*.)

CHEMISTRY.

1. (a) *Analysis* is the splitting up of a compound into its elements or into simpler compounds.

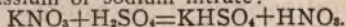
(b) *Synthesis* is the building up of a compound from elements or from simpler compounds.

2. (a) *Bases* are ternary compounds capable of entering into double decomposition with an acid to produce a salt and water. *Examples*: Potassium hydroxide, KOH; Calcium hydroxide, $\text{Ca}(\text{OH})_2$.

(b) *Acids* are compounds of an electronegative element or radical with hydrogen, part or all of which hydrogen they can part with in exchange for an electropositive element, without the formation of a base. *Examples*: Sulphuric acid, H_2SO_4 ; nitric acid, HNO_3 .

(c) *Salts* are substances formed by the substitution of an electropositive element for part or all of the replaceable hydrogen of an acid. *Examples*: Sodium nitrate, NaNO_3 ; Monopotassic sulphate, KHSO_4 .

3. HNO_3 is prepared by the action of strong sulphuric acid on potassium or sodium nitrate;



HNO_3 is a colorless liquid, with a strong acid taste and reaction. It is a strong oxidizing agent, and dissolves most metals, with the formation of nitrates. With hydrochloric acid, it forms aqua regia, which is capable of dissolving the so-called "noble metals." In damp air it gives off white fumes. When strongly heated it is decomposed into H_2O , N_2O_4 and oxygen.

4. The standards based on water are: (1) The freezing point on the thermometer; (2) the boiling point on the thermometer; (3) specific gravity of solids and liquids; (4) the gram (the unit of weight) and the liter (the unit of volume), with their multiples and fractions; (5) specific heat.

5. Both mercurous and mercuric salts enter into double

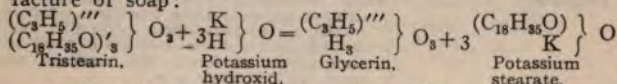
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decomposition with potassium iodide, and a soluble iodide of mercury is produced.

6. *Carbohydrates* were formerly defined as substances of unknown constitution, composed of carbon, hydrogen, and oxygen; the last two being in the proportion to form water.

7. *Proteins* consist of carbon, hydrogen, oxygen, nitrogen, and sulphur, some also contain phosphorus, and a few iron.

8. Glycerin is obtained as a by-product in the manufacture of soap:



10. *Test for indican in the urine:* The urine is mixed with one-fifth its volume of 20 per cent. solution of lead acetate and filtered. The filtrate is mixed with an equal volume of fuming hydrochloric acid containing 3:1000 of ferric chlorid, a few drops of chloroform are added, and the mixture strongly shaken one to two minutes. With normal urine the chloroform remains colorless, or almost so; but if an excess of indoxyl compounds be present the chloroform is colored blue, and the depth of the color is a rough indication of the degree of the excess. (From Witt-*haus' Essentials of Chemistry.*)

PHYSIOLOGY.

1. **Physiology** is that branch of science which treats of the functions of living tissues and organisms in a state of health.

2. **Metabolism** is a name given to the entire series of changes that occur in a cell or organism during the processes of nutrition. It is of two kinds: (1) Assimilative, or constructive, called *anabolism*, and (2) destructive, called *catabolism*.

3.—

DIGESTIVE FERMENTS	ORIGIN	FUNCTIONS
Ptyalin.....	Saliva.....	Changes starches into dextrin and sugar.
Pepsin.....	Gastric juice.....	Changes proteins into proteoses and peptones in an acid medium.
A curdling ferment.....	Gastric juice.....	Curdles the casein of milk.
Trypsin.....	Pancreatic juice.....	Changes proteins into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; in an alkaline medium.
Amylopsin.....	Pancreatic juice.....	Converts starches into maltose.
tSeapsin.....	Pancreatic juice.....	Emulsifies and saponifies fats.
A curdling ferment.....	Pancreatic juice.....	Curdles the casein of milk.
Invertin.....	Succus entericus.....	Converts maltose into glucose.

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4—

ELIMINATIVE ORGANS	SUBSTANCES ELIMINATED
Kidneys.....	Urine; which consists of water, urea, uric acid, hippuric acid, creatinine, extractives, chlorides, phosphates and sulphates, and other salts.
Skin.....	Perspiration; which consists of water, urea, sodium chloride, other salts, fats, and fatty acids.
Lungs.....	Carbon dioxide and water.
Intestines.....	Feces; which consist of water, nitrogen, hydrogen, carbon dioxide, hydrogen sulphide, methane, undigested food, indigestible matter, bacteria and the products of their decomposition of foods, bile residues, excretin and inorganic salts.
Liver.....	Bile.

7. A *reflex arc* is a complex made up of: (1) A surface capable of receiving an impression; (2) an afferent nerve; (3) a nerve cell capable of receiving and also of sending out impulses; (4) an efferent nerve, and (5) a surface capable of responding in some way to the impulse conveyed by the efferent nerve.

8. An adult normally passes about 50 ounces of urine daily; the normal color is some shade of yellow; the reaction is acid; for constituents, see above, Question 4.

9. The amount of urine may be physiologically increased by increasing the amount of liquids ingested; and decreased by anything which increases the secretion of perspiration.

10. *The functions of the skin* are: Protection, sense of touch, excretion, regulation of body temperature, absorption, and respiration.

ANATOMY.

2. The ovarian arteries arise from the abdominal aorta.

3. The *superficial external pudic artery* supplies the skin of the lower part of the abdomen and of the penis and scrotum in the male and the labia in the female.

The *deep external pudic artery* supplies the skin of the scrotum in the male and the labia in the female.

The *internal pudic artery* supplies the external organs of generation.

4. *Scarpa's triangle* is bounded *above* by Poupart's ligament; *externally* by the Sartorius; and *internally* by the inner margin of the Adductor longus; its *apex* is formed by the junction of the Adductor longus and Sartorius. The *floor* is formed, from without inward, by the Iliacus, Psoas, Pectineus, Adductor brevis, and Adductor longus.

6. In making a McBurney incision the following struc-

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tures are divided: Skin, superficial and deep layers of the subcutaneous fascia, External oblique, Internal oblique, and Transversalis muscles, Transversalis fascia, subserous areolar tissue, and the Peritoneum.

7. The flexor group of muscles of the forearm is supplied by the median and ulnar nerves.

8. The spermatic arteries arise from the abdominal aorta.

10. The muscles attached to the greater trochanter of the femur are: Gluteus medius, Gluteus minimus, Piriformis, Obturator internus, Obturator externus, Gemellus superior, Gemellus inferior, and Quadratus femoris.

PATHOLOGY.

1. Pathology is that branch of science which treats of disease; it includes the causes, nature, manifestations, structural changes, and results.

3. *Osteomyelitis* is inflammation of the bone and marrow.

It is *caused* by infection by microorganisms, which may gain entrance by a wound, through neighboring tissues, or through the blood.

4. Cerebrospinal fluid can be recognized by its ability to reduce Fehling's solution.

In tuberculous meningitis the fluid should be centrifugalized and examined microscopically (by stained films); cultures may also be made and a bacteriological examination will indicate the presence of the tubercle bacillus.

5. PULMONARY EDEMA. *Cause*: The cause of edema of the lung is frequently a loss of power in the left ventricle while the right continues to functionate, the extreme degree of stasis attained leading to rapid transudation.

Pathology: The lung is paler than usual, unless at the same time congested; it feels firm, parts of it even resembling hepatized lung, and on section a frothy fluid escapes in quantity; both lungs or a part of one may be involved. With inflammation of part of a lung the rest is apt to become edematous. Pulmonary edema occurs as the final stage of heart and kidney disease and occasionally in alcoholic and insane patients. (From Thayer's *Pathology*.)

6. (a) *Necrosis* is the complete and permanent arrest of nutrition in a part; or local death of tissues.

(b) In *dry gangrene* hemorrhage is prevented by embolism or thrombosis of the vessels.

In *moist gangrene* hemorrhages are fairly common; in some cases the vessels being eroded the thrombi are expelled; in others there is a hemorrhagic condition due to toxemia.

7. *Thrombosis* is the coagulation of the blood within the vessels during life.

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9. Albumin is found in the urine: "(1) In fevers, as typhoid and pneumonia. (2) In valvular heart lesions, degeneration of the heart muscle, diseases of the coronary arteries, impeded pulmonary circulation, in pregnancy by pressure upon the renal veins, in intestinal catarrh and in Asiatic cholera. (3) In purpura, scurvy, leukemia, pernicious anemia, jaundice, diabetes, and syphilis. (4) After taking lead, mercury, iodine, phosphorus, arsenic, antimony, chloroform, cantharides, oxalic, carbolic, salicylic, or the mineral acids, turpentine, and nitrates. (5) In large amounts in acute nephritis, and chronic parenchymatous nephritis; in small amount in chronic interstitial nephritis and amyloid kidney." (Witthaus' *Essentials of Chemistry*.)

SYMPTOMATOLOGY.

1. *Tania solium*: "The mature worm measures two or three yards in length; a ripe proglottis is about ten mm. long and six mm. broad, with the sexual opening placed laterally; the uterus is coarsely branched. The head, whose size is about the same as the head of a large ordinary pin, has four suckers, often pigmented, and a small rostellum, with a ring of twenty to thirty hooklets. The ova, which are nearly spherical, are readily recognized by their thick shell, with radiating striations. Inside the ovum, when mature, the six hooklets of the embryo may be visible.

"*Tania mediocanellata* is larger than *T. solium*, and attains a length of five to nine yards. The ripe proglottides measure sixteen mm. in length by five mm. in breadth, but immature segments are broader than they are long. Very often they exhibit movements after they have been detached from the strobilus and have passed from the bowel. The sexual opening is lateral and the uterus is finely ramified, with frequent dichotomous divisions of the primary branches. The head is rather square in outline and is larger than that of *T. solium*. It has four suckers, but is devoid of hooklets. The ova closely resemble those of *T. solium*, but are slightly longer in proportion to their breadth." (From Hutchinson and Rainy's *Clinical Methods*.)

Symptoms are similar in both cases. Often there are no subjective symptoms; there may be dyspepsia, emaciation, ravenous appetite, fetid breath, headache, diarrhea, nausea, vomiting, colicky pains, vertigo, chorea, itching of the nose, and about the anus. The diagnosis is made from finding segments or eggs in the dejecta.

2. The *causes* of acute intestinal obstruction are: Strangulation, intussusception, volvulus, gallstones, tumors,

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strictures, fecal impaction, foreign bodies, and intestinal paralysis.

The *symptoms* are well shown in the following table (from Gould and Pyle's *Cyclopedia of Medicine and Surgery*):

STRANGULATION	INTUSSUSCEPTION	TWISTS (VOLVULUS)
<i>Subjective Symptoms</i> 1. Generally occurs after age of 20. 2. Pain localized, rapid collapse. 3. Pain intense, paroxysmal in character. 4. Constipation complete.	<i>Subjective Symptoms</i> 1. Most frequent in childhood. 2. Constant tenesmus. 3. Pain develops suddenly and is continuous. 4. Frequent diarrhea, passage of bloody mucus.	<i>Subjective Symptoms</i> 1. Most frequent after age of 30. 2. Pain diffuse. 3. Pain paroxysmal; recurs less often than in strangulation. 4. Constipation complete.
<i>Objective Symptoms</i> 1. Temperature often subnormal. 2. Pulse very weak. 3. Stercoraceous vomiting comes on early. 4. Location in small intestine.	<i>Objective Symptoms</i> 1. Temperature normal or subnormal. 2. Same as in strangulation. 3. Same as in strangulation. 4. Localization in small intestine; bowel frequently protrudes at rectum.	<i>Objective Symptoms</i> 1. Temperature slightly elevated. 2. Same as in strangulation. 3. Same as in strangulation. 4. Location, small intestine; abdomen often protrudes, in certain areas, giving dullness on percussion.

6.—

ACUTE LOBAR PNEUMONIA	BRONCHOPNEUMONIA
Generally a primary disease.	Generally secondary (to bronchitis or an infectious disease).
Age has little influence.	Generally found in very young or very old.
Sudden onset.	Gradual onset.
Fever is high and regular.	Fever is not so high, and is irregular.
Ends by crisis between sixth and tenth day.	Ends by lysis, at no particular date.
Generally only one lung affected.	Generally both lungs affected.
The physical signs are distinct; and there is a large area of consolidation.	Physical signs indistinct; and the evidences of consolidation are indefinite.
Sputum is rusty.	Sputum is rather streaked with blood.

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3. *Subphrenic abscess*: "A subphrenic abscess is a collection of pus beneath the diaphragm. The pus, as a rule, occupies a part of the lesser peritoneal cavity; in rare instances it is extraperitoneal (when it is of renal origin); in some cases it is contained in the area between the diaphragm, cardiac end of the stomach, and liver or spleen. It is an unusual thing for such an abscess to break into the gen-

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eral cavity of the peritoneum, but it may break into the pleural sac.

"Causes: Perforation of a gastric ulcer, perforation of the gall-bladder or gall-ducts, ulceration of the duodenum, diseases of the liver, spleen, pancreas, intestine, appendix, or kidney, hydatid disease, internal injury, metastasis, external injury, caries of rib, or disease of the pleura may be responsible for a subphrenic abscess.

"Symptoms: These are the constitutional symptoms of suppuration and a swelling in the subdiaphragmatic region, these symptoms ensuing upon one of the causative conditions before mentioned. In many cases the abscess cavity contains gas as well as fluid. Empyema and subphrenic abscess resemble each other. In empyema the upper limit of the fluid is concave; in subphrenic abscess it is convex. In empyema the flow of pus through an aspirating needle will be most marked during inspiration; in abscess during expiration—the same is true of the rush of gas. In empyema the needle does not oscillate; in abscess it does. The fact that an abscess contains gas is shown by the existence of a tympanic percussion-note over a part of the cavity and an alteration in the area of tympany with an alteration in the position of the patient. An abscess of the liver does not contain gas and alters decidedly the outlines of the organ." (From Da Costa's *Modern Surgery*.)

4. *The early symptoms of hip-joint disease* are: Night cries (in a child); lameness in the morning; a slight limp; tendency to become tired on slight exertion; wasting; spasm; pain; swelling; and deformity (either real or apparent).

5. *Symptoms of hypertrophy of the prostate gland:* Slowness in starting urination; difficult micturition; frequency of micturition, particularly at night; the presence of residual urine; dull, aching pain in the perineum and above the pubes; enlargement of the lateral lobes of the prostate; there may be cystitis and retention of urine.

The *cause:* It is a senile change, and may be due to increase of the glandular substance or of the interstitial fibrous or muscular tissue.

7. *In fracture of the internal condyle of the humerus:* The fragment forms a projection at the back of the elbow; if the swelling is not too great, crepitus may be elicited by flexing and extending the forearm; preternatural mobility exists; the space between the condyles is increased; the forearm bends towards the ulnar side; and the "carrying function" is lost.

8. *Malignant tumors* are not encapsulated, tend to infiltrate the surrounding tissues, give rise to metastatic growths, have a tendency to recur after removal, give a cachexia, have a fatal tendency.

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Benign tumors are encapsulated, do not tend to infiltrate the surrounding tissues, do not give rise to metastatic growths, do not tend to recur after removal, do not produce cachexia, and do not have a fatal tendency (except from their location).

9. The cause of dry gangrene is: Deficiency of arterial blood.

10. In *synovitis of the knee-joint* the effusion is behind the patella, the patella is lifted up by the effusion, and floats.

In *housemaid's knee* the swelling is in front of the patella, the patella does not float, and the joint is not affected.

OBSTETRICS.

1. (a) *Pregnancy* is the state of being with child, or the state of the woman from conception till the product of conception is expelled.

(b) *Fecundation* is the union of the spermatozoon with the ovum.

2. (a) The *funis*, or umbilical cord, is a cord-like structure extending from the umbilicus of the fetus to the placenta.

(b) At full term the *placenta* is from six to nine inches in diameter, about three-quarters of an inch in thickness at the central point, and weighs about one pound; the *funis* is about eighteen inches long, and about a quarter of an inch in thickness. All of these measurements are liable to considerable variations.

3. *Extrauterine pregnancy* is a pregnancy in which the ovum is developed outside of the uterine cavity.

"When extrauterine pregnancy exists there are: (1) The general and reflex symptoms of pregnancy; they have often come on after an uncertain period of sterility; nausea and vomiting appear aggravated. (2) Then comes a disordered menstruation, especially metrorrhagia, accompanied with gushes of blood, and with pelvic pain coincident with the above symptoms of pregnancy; pains are often very severe, with marked tenderness within the pelvis; such symptoms are highly suggestive. (3) There is the presence of a pelvic tumor characterized as a tense cyst, sensitive to the touch, actively pulsating; this tumor has a steady and progressive growth. In the first two months it has the size of a pigeon's egg; in the third month it has the size of a hen's egg; in the fourth month it has the size of two fists. (4) The *os uteri* is patulous; the uterus is displaced, but is slightly enlarged and empty. (5) Symptoms No. 2 may be absent until the end of the third month, when suddenly they become severe, with spasmodic pains, followed by the general symptoms of collapse. (6)

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Expulsion of the decidua, in part or whole. Nos. 1 and 2 are *presumptive signs*; Nos. 3 and 4 are *probable signs*; Nos. 5 and 6 are *positive signs*." (*American Text-book of Obstetrics*.)

4. (a) *Hydatid pregnancy* is a pregnancy in which the chorionic villi undergo a proliferating degeneration with the production of a mass of cysts attached to the placenta. These cysts look like bunches of grapes.

(b) The pregnancy begins as in normal cases, but in about the third month the uterus becomes suddenly and rapidly enlarged; irregular uterine hemorrhages occur; and there is a discharge of fluid containing the vesicular growths; labor occurs, and the mass of cysts is expelled.

6. (a) *Labor* is the process by which a pregnant woman expels the product of conception at or near term.

(b) Three stages.

(c) Crede's is the best method of delivering the placenta.

8. "By the *mechanism of labor* we understand the operation of the mechanical forces and the execution of the mechanical movements necessary to secure the passage of the child through and its exit from the parturient canal." (*From King's Obstetrics*.)

9. The following (from Gould and Pyle's *Cyclopædia of Medicine and Surgery*) is a useful classification of the hemorrhages in question:

A. *Hemorrhages of Pregnancy*: Caused by (1) placenta prævia; (2) premature separation of a normally situated placenta; (3) apoplexy of the decidua or placenta.

B. *Hemorrhages of Labor*: Caused by (1) placenta prævia; (2) premature separation of a normally situated placenta; (3) relaxation of the uterus; (4) laceration of the cervix; (5) rupture or inversion of the uterus.

C. *Hemorrhages of the Puerperium*: Caused by (1) retained secundines; (2) displaced uterus; (3) displaced thrombi; (4) fibroid tumors; (5) hypertrophied decidua; (6) carcinoma.

STATE BOARD EXAMINATION QUESTIONS.

CONNECTICUT STATE BOARD EXAMINATIONS.

PHYSIOLOGY.

1. Give the steps in the digestion of a piece of bread and butter.
2. Define and illustrate metabolism.
3. What effect has diet upon the secretion and the constituents of milk? Illustrate.
4. (a) Name the ductless glands and give their func-

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tions; (b) What effect has the removal of the thyroid gland (c) and parathyroid?

5. Name in order the cranial nerves, and state whether motor, sensory, or of special sensation.

6. (a) What are leucocytes? (b) Give their functions in the normal body.

7. (a) What nerves control the action of the heart? (b) Locate and give the function of the cardio-inhibitory center and cardio-augmentory center.

8. What are the normal heart sounds? How are they produced?

9. (a) Give a short description of secretion of urine. (b) Upon what does the quantity secreted depend?

10. Enumerate and give the usual time of the eruption of the deciduous teeth, (a) and of their displacement; (b) the permanent teeth.

ANATOMY.

1. Describe the structure and physical properties of bone.

2. Mention in order the varieties of vertebræ and give the distinguishing marks of each variety. Illustrate by pen drawing.

3. Describe the attachments of the sterno-cleido-mas-toideus muscle; (b) its function; (c) its value as a "land-mark."

4. Describe the brachial plexus. The great sciatic nerve.

5. Describe the portal circulation.

6. Describe Scarpa's triangle; the popliteal space. Give the surgical importance of each.

7. Give a short description of the pleuræ.

8. Describe the uterus, also location, structure, supports, function.

9. Where are Peyer's glands found? What is their size, structure, and function?

10. Give the anatomy of the kidney. Make sketch of the minute anatomy of the same.

CHEMISTRY AND HYGIENE.

1. Give both (a) the normal and (b) the abnormal constituents of the urine. (c) Give a test for sugar and pus.

2. What are the chemical features in (a) disinfection? (b) fermentation? (c) decomposition?

3. What is the chemical explanation of the acidity of normal urine?

4. Give the general composition of living matter.

5. (a) What condition constitutes impure milk? (b) How is it adulterated? (c) What diseases may be spread

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through the medium of milk? (d) What are the duties of a milk inspector?

6. (a) Should a house water supply become contaminated, how would you detect it? (b) How does sewer gas differ from sewer air?

7. (a) From what sources may chronic lead poisoning arise? (b) Give symptoms and treatment.

8. Give the formula, use, and antidote for corrosive sublimate.

9. In two specimens of urine one is found to have a specific gravity of 1005; the other 1038. Describe the further urinary analysis, and give reports you would make.

10. (a) Define gas. (b) Define laughing gas. (c) Define marsh gas. (d) Define sewer gas. (e) Define diffusion of gases.

MATERIA MEDICA AND THERAPEUTICS.

1. Give the action and therapeutic uses of thyroid extract. (Desiccated thyroid glands.)

2. Give the treatment of the three principal varieties of intestinal parasites.

3. What are the indications for the use of pepsin, for pancreatin, for diastase?

4. What are the preparations and therapeutic uses of benzoïn?

5. Name the official preparations of strontium and give their physiological action.

6. What is the physiological action of Fowler's solution? What are its uses and what are the symptoms of overdosage?

7. What is the action of sodium phosphate and what are the therapeutic uses?

8. What are the chemical antidotes for poisoning by the following drugs: bichloride mercury, carbolic acid, strychnine; and what would be their reaction? What would be a physiological antidote for opium?

9. Define an analgesic and state its action centrally and peripherally.

10. Give the physiological action of gelsemium and name some of the indications for its use.

SURGERY.

1. Name three microorganisms which may cause conditions requiring surgical interference, and give clinical symptoms of the form of disease each is most likely to induce.

2. Abdominal palpation, (a) technique, (b) findings and limitations.

3. Spinal anesthesia, (a) technique, (b) dangers.

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4. Laboratory diagnosis of hydrophobia; (a) general technique, (b) your view of the reliability of the findings, (c) Pasteur treatment.
5. Diagnosis of intestinal obstruction of the ileum low down.
6. Diagnosis of obstruction at the pylorus.
7. Tracheotomy and intubation of the larynx compared as to (a) indications, (b) contraindication of each.
8. (a) Surgical anatomy of oblique inguinal hernia. (b) In what respects do direct inguinal hernia differ?
9. Diagnosis and treatment of acute middle ear infection.
10. How would you treat intracapsular fracture of the head of the femur on a vigorous patient of sixty? How in a feeble patient of seventy-five?

OBSTETRICS AND GYNECOLOGY.

1. (a) Describe asphyxia neonatorum. (b) How is it prevented? (c) Method of resuscitation.
2. In extraction of the after-coming head, give method of procedure in (a) arrest of head and arm at the superior strait; (b) arrest of an arm behind the occiput; (c) closure of construction ring about the neck.
3. Give causes and treatment of (a) hematocele, (b) cystocele, (c) rectocele.
4. Give the cause, prognosis, and treatment of pernicious vomiting of pregnancy.
5. How would you determine the previous existence of pregnancy in a given case of medicolegal importance?
6. (a) Name all the conditions that may cause delay in the first stage of labor. (b) To what is due the rigidity of the cervix?
7. (a) What is the distinction between presentation and position? (b) Describe the management in posterior positions of the occiput.
8. Give differential diagnosis of extrauterine pregnancy.
9. (a) Give all the causes of post-partum hemorrhage. (b) Give your method of treatment.
10. (a) When is the uterine sound contraindicated? (b) When is the uterine curette indicated?

PRACTICE, PATHOLOGY, AND DIAGNOSIS.

1. What is meant by ptomaine poisoning? Give some of the varieties and the general symptoms in these cases.
2. What is the etiology, the pathology, and what are the symptoms of arteriosclerosis? Mention possible sequels.
3. Differentiate between asthma and emphysema by their symptoms and pathological changes.
4. Name the causes of vomiting; (a) direct, (b) reflex.

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5. What are the symptoms and sequelæ of a non-compensating heart?
6. Differentiate between eczema and psoriasis.
7. Give the symptoms of tubercular meningitis.
8. What are the causes and symptoms of obstruction of the ductus communis choledochus?
9. Differentiate pleuritis from intercostal neuralgia.
10. Describe a case of acute polomyelitis anterior.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

CONNECTICUT STATE BOARD EXAMINATIONS.

PHYSIOLOGY.

1. *Bread* consists of proteid, fat, carbohydrate, salts, and water. *Butter* consists of fat, a little proteid, and water. In the *mouth*, the ptyalin of the saliva changes starch into dextrin and sugar; in the *stomach*, the proteids are changed into proteoses and peptones; in the *small intestine*, the proteids are further changed into proteoses and peptones and afterwards into leucin and tyrosin, starches are converted into maltose, fats are emulsified and saponified.

2. Metabolism is a name given to the entire series of changes that occur in a cell or organism during the processes of nutrition. It is of two kinds: (1) anabolic, or constructive, and (2) catabolic, or destructive.

3. Too little food decreases both the quantity of milk and the percentage of solids. An ample diet increases both the quantity of milk and the percentage of solids. Abundance of proteids in the food increases the fat in the milk; so also does fat in the food, if it is well digested. Watery food increases the amount of milk, but diminishes the percentage of solids.

4. (a) The *ductless* glands are: The spleen, thymus, thyroid, parathyroids, suprarenals, carotid, coccygeal, pituitary, and pineal glands.

The *function of the spleen*.—The following theories have been held: (1) It is a source of production of the white blood corpuscles; (2) it is a source of production of the red blood corpuscles during fetal life; (3) it is a place where the red blood corpuscles are destroyed; (4) uric acid is produced in the spleen; (5) an enzyme is produced in the spleen and is carried by the blood to the pancreas, where it converts the trypsinogen into trypsin.

The *function of the thymus* is not settled; it is said:—(1) to be a blood forming organ; (2) to have influence on

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growth and nutrition; (3) in hibernating animals it is supposed to store up materials which can be utilized during the period of inactivity.

The *function of the thyroid* is not definitely settled; (1) it has some trophic function; (2) it is supposed to antagonize toxic substances; (3) it produces an internal secretion.

The *function of the suprarenals* is not definitely settled; they produce an internal secretion which is probably necessary to life; it is supposed that they are able to destroy or remove some toxic substance produced elsewhere in the body.

The *function of the other ductless glands* is unknown. They all, or nearly all, furnish an internal secretion.

(b) *Removal of the thyroid* causes mental and bodily dullness and apathy, tremors, twitchings, overgrowth of the connective tissues, and development of fat; the hairs fall out, and the patient becomes unwieldy and clumsy in both body and mind. Complete removal causes death in most animals, and it is not considered justifiable in man.

(c) *Removal of the parathyroid* is supposed to cause death; it is believed by some that removal of the thyroid alone does not cause death, but that this is due to loss of the parathyroids only.

6. (a) The leucocytes, or white blood cells, are spheroidal masses, varying in size, having no cell wall, and containing one or more nuclei; there are about 7,000 to 10,000 of them in each cubic millimeter of blood. They differ much in appearance, and are divided into (1) small mononuclear leucocytes, or lymphocytes, (2) large mononuclear, (3) transitional, (4) polynuclear, or polymorphonuclear, or neutrophile, and (5) eosinophile. They are all more or less granular, particularly the last two varieties named. They are probably formed in the spleen, lymphatic glands, and lymphoid tissues. Their fate is uncertain; it has been asserted that they are converted into red blood cells; they play a part in the formation of fibrin ferment; they are sometimes converted into pus cells.

(b) Their functions are (1) to serve as a protection to the body from the incursions of pathogenic microorganisms; (2) they take some part in the process of the coagulation of the blood; (3) they aid in the absorption of fats and peptones from the intestine; and (4) they help to maintain the proper proteid content of the blood plasma.

7. (a) The action of the heart is controlled by:—the pneumogastric nerves and the sympathetic nerves.

(b) The *cardio-inhibitory center* is located in the floor of the fourth ventricle; the *cardio-augmentory center* is located in the medulla.

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8. The *causes* producing the *first* sound of the heart are not definitely ascertained; the following are supposed to be causatory factors: (1) The vibration and closure of the auriculo-ventricular valves, (2) the muscular sound produced by the contraction of the ventricles, and (3) the cardiac impulse against the chest wall.

The *second* sound is caused by the vibration due to the closure of the semilunar valves.

9. (b) The quantity of urine secreted depends upon:—the amount of liquids ingested, the amount of perspiration secreted, the temperature and moisture of the surrounding atmosphere, increase or decrease of blood pressure, and the presence or absence of certain diseases such as diabetes, nephritis, etc.

CHEMISTRY AND HYGIENE.

1. (a) The *normal* constituents of the urine are:—water; urea; uric acid; hippuric acid; creatinine; extractives; chlorides, phosphates, and sulphates of sodium, potassium, etc.

(b) *Abnormal* constituents are:—albumin, sugar, blood, bile, pus, diacetic acid, chyle, mucus, epithelial cells, tube casts, bacteria, parasites.

(c) *Test for Sugar*: Render the urine strongly alkaline by addition of Na_2CO_3 . Divide about 6 c.c. of the alkaline liquid into two test-tubes. To one test-tube add a very minute quantity of powdered subnitrate of bismuth, to the other as much powdered litharge. Boil the contents of both tubes. The presence of glucose is indicated by a dark or black color of the bismuth powder, the litharge retaining its natural color. (From Witthaus' *Essentials of Chemistry*.)

Chemical test for *pus* in the urine: Acidify the urine with acetic acid, then filter it, and treat the filter with a few drops of freshly prepared tincture of guaiacum; a deep blue color denotes the presence of pus.

2. (a) *Disinfection* may be due *chemically* to oxidation, or to the formation of new compounds, or by changing the reaction of the medium containing the bacteria.

(b) *Fermentation* is a chemical transformation of *carbohydrates* as the result of the activity of microorganisms.

(c) *Decomposition* or putrefaction is a chemical disintegration of *nitrogenous compounds* as the result of the activity of microorganisms.

3. The acidity or normal urine is due, *chiefly*, to monopotassic and monosodic phosphates; *slightly* to carbonic acid; and *indirectly* to uric acid.

4. The general composition of living matter is: water, 75 to 85 per cent.; solids, 15 to 25 per cent. The most

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important of the solids are *proteids*, which contain: carbon, hydrogen, oxygen, nitrogen, sulphur, and phosphorus.

5. (a) Milk is impure when it contains any foreign substance, or any adulterant, or has been skimmed, or in any way differs from the standard of normal milk.

(b) Milk may be adulterated by the addition of water (clean or dirty), by skimming, by the addition of coloring matters or preservatives, and by the addition of solid substances, such as sugar, flour, etc.

(c) Diseases that may be spread through the medium of milk are:—typhoid, scarlet-fever, tuberculosis, diphtheria, diarrheal diseases, and Asiatic cholera.

(d) The duties of a milk inspector are the investigation of milk as to:—color, odor, taste, reaction, specific gravity, acidity, proportion of fat, total solids, determination of albumin, milk-sugar, ash, percentage of cream, presence of preservatives or other added chemicals, coloring matter, dilution, added solids, pathogenic microorganisms, dirt or other foreign matter. There should also be thorough investigation as to its source, the cows and their environment, the method employed in caring for, milking, storing, and transmitting the milk.

6. (b) *Sewer gas* "is but a mixture of a number of gases, such as carbonic acid, carburetted hydrogen, ammonium and hydrogen sulphide, nitrogen, etc., together with a considerable amount of fetid organic matters, the volatile or semi-volatile products of animal and vegetable decomposition, varying according to the condition of the sewer, the kind of matter received therein, the amount of surplus water, etc." (Egbert's *Hygiene and Sanitation*.)

Sewer air is atmospheric air with its oxygen diminished and its carbon dioxide increased from 0.04 per cent. to 0.4 per cent., and contaminated with more or less marsh gas, sulphuretted hydrogen, ammonium, sulphide, etc.

7. (a) The most common sources of lead poisoning are the following: "The contamination of drinking water from lead pipes. Contamination of articles of food or drugs by contact with leaden vessels, or from being enclosed in tinfoil containing an excess of lead. Drinking beer, cider, etc., which has been drawn through leaden pipes or allowed to stand in pewter vessels. The ingestion or constant handling of lead or its compounds, as the acetate, nitrate, carbonate (white lead—painter's colic), Goulard's extract, etc. The use of hair dyes containing lead." (Witt-haus' *Essentials of Chemistry*.)

(b) The symptoms of chronic lead poisoning are: Wrist drop, severe colic around the umbilicus, constipation, feces

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clay colored, blue line on the gums at the junction with the teeth.

The *treatment* is first to remove the cause; then administer a purge of jalap and calomel combined with opium; iodide of potassium should also be given to help in the elimination of the lead.

8. CORROSIVE SUBLIMATE. *Formula*: HgCl_2 . *Use*: It is an antiseptic. *Antidote*: White of egg, followed by an emetic.

10. (a) *Gas* is that form of matter in which the molecules constantly endeavor to get away from each other, and so to occupy a greater space; it has neither definite form nor volume.

(b) *Laughing gas* is nitrogen monoxide, N_2O .

(c) *Marsh gas* is methane, CH_4 .

(d) *Sewer gas* is the mixture of gases derived from sewers; and see above, question 6 (b).

(e) *Diffusion of gases* is the spontaneous and gradual passage of one gas into another gas.

MATERIA MEDICA AND THERAPEUTICS.

1. THYROID EXTRACT. *Action*: It is a powerful vasomotor dilator, causing flushing of the cutaneous surface; large doses are apt to produce loss of appetite and diarrhea; it stimulates the cerebrum, and, given to excess, produces headache, restlessness, insomnia, palpitations, hot flushes, sweating, tremors, and even convulsions; it is excreted by the kidneys, and the quantity of urine is uniformly increased by it; it induces a greatly increased oxidation in the system.

Uses: Myxedema; goiter (especially the hyperplastic follicular variety); sporadic cretinism; arteriosclerosis; delayed menstruation." (Wilcox's *Materia Medica*.)

2. *Treatment of Tapeworm*. Give a dose of castor oil at night, and the following morning give half a dram of freshly prepared extract of male fern, and a few hours later give another dose of castor oil.

Treatment of Roundworm. A dose of santonin and calomel should be given at bedtime for a few nights, and a dose of castor oil the morning after the last powder.

Treatment of Seatworm, or Pinworm. A large enema of a cold infusion of quassia. Care must be taken to prevent reinfection.

4. BENZOIN. *Preparations*: Adeps benzoïnatus, tinctura benzoïn, tinctura benzoïn composita, acidum benzoicum, ammonii benzoas, sodii benzoas, lithii benzoas.

Therapeutic uses:—"Locally, wounds, ulcers, old sinuses, etc.; chilblains; the itching of urticaria or eczema; chapped lips, hands, or nipples; catarrhal affections of the pharynx

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or larynx. Internally, disordered conditions of the urine (as ammoniacal urine and phosphaturia); vesical calculi; chronic gonorrhea; incontinence due to alkalinity of the urine; chronic Bright's disease; diarrheal diseases; respiratory affections." (Wilcox's *Materia Medica*.)

6. The symptoms of *overdosage of Fowler's solution* are:—Nausea, dryness of throat, gastralgia or diarrhea, irritation of conjunctiva or nasal mucous membrane, and particularly a facial edema under the eyes (more noticeable in the morning).

8. The chemical antidote for poisoning by:—Bichloride of mercury is white of egg; by carbolic acid is sodium sulphate; by strychnine is tannic acid.

The reactions are as follows:—Mercury and white of egg give insoluble albuminate of mercury; carbolic acid and sodium sulphate give insoluble sodium sulphocarbolate; strychnine and tannic acid give insoluble tannate of the alkaloid.

Cocaine is thought by some physicians to be a physiological antidote for opium. Strychnine, and atropine and amyl nitrite have also been quoted as physiological antidotes.

9. An *analgesic* is a remedy which relieves pain either by direct depression of the centers of perception and sensation in the cerebrum, or by impairing the conductivity of the sensory nerve fibers. (Potter.)

10. *Action of gelsemium*:—"When given internally gelsemium acts as a powerful depressant to the respiratory, circulatory, and nervous systems. It acts as a depressant to the heart muscle and vagus nerves, and under its influence there is a diminution in the pulse force and blood pressure. It primarily depresses the sensory side of the spinal cord; but later, if given in large amount, depresses the motor side. The drug has no effect upon the spinal nerves, but the motor cranial nerves are paralyzed by large doses. In moderate amounts it causes the respiration to become slow and feeble, and in lethal quantities paralyzes the respiratory centers." (*U. S. Dispensatory*.)

Indications:—Headache, migraine, asthma, whooping cough, nervous cough, spasmodic dysmenorrhea, torticollis, and other conditions depending upon localized muscular spasm.

SURGERY.

3. (a) "Not more than one-third of a grain of cocaine should be used. The solution is best prepared by dissolving sterilized cocaine crystals in cerebrospinal fluid, which is drawn into the syringe containing the cocaine

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after the introduction of the needle into the subarachnoid space. Eucaïne, tropacocaine, and stovain may be employed in a similar manner. The strictest asepsis must be practised. The patient lies on the side or assumes the sitting posture; in either case the back should be bent forward in order to increase the space between the vertebral arches. The operator places one finger upon the spine of the fourth lumbar vertebra, which is on a line drawn between the two iliac crests, and enters the needle just below and to the right of this point, in a slightly upward and inward direction, until cerebrospinal fluid escapes, which in the adult is usually at a depth of two and one-half inches. The barrel of the syringe containing the cocaine is now attached to the needle, and sufficient cerebrospinal fluid withdrawn to effect solution. The fluid is then slowly injected, the needle withdrawn, and the puncture sealed with collodion.

(b) "The chief dangers are infection, injury to the cord, and poisoning from the anesthetic employed." (Stewart's *Manual of Surgery*.)

OBSTETRICS AND GYNECOLOGY.

2. (a) "The body of the fetus should be pushed a little forward in order to diminish the pressure on the arms at the brim, and the child's body should be rotated until its back is directed toward one or other side of the mother. It should then be pressed well forward against the symphysis in order that an attempt may be made to free the arm which is most posterior. The hand is passed upward into the hollow of the sacrum and the first two fingers along the side of the neck behind the posterior arm as far as the elbow. The latter should then be swept over the face and thorax until it comes to lie within the pelvic cavity. The body of the child is then pressed backward against the perineum, and an attempt made to bring down the anterior arm by a proceeding similar to that employed in the case of the other one. Sometimes it is impossible to get room enough to carry out this latter procedure. In such a case the body of the child should be carefully rotated by both hands placed on the thorax, the back of the child moving across the front of the mother's pelvis. The thorax should be well pushed up when this maneuver is begun in order to diminish the risk of dislocating the neck. By this rotation of the back of the child from one side of the mother's pelvis to the other, the arm which was anterior is made to lie posterior, and then it may be more easily drawn down.

(b) "In some cases an arm gets jammed over the back of the head between the occiput and the pelvic wall. In

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freeing it the fingers should be passed up over the back of the fetus, and the arm carefully pushed around the side of the head to its own side. The elbow may then be drawn down over the face and thorax. Sometimes the arm in such a case may be released from its dorsal position by rotating the body in the opposite direction from that which caused the trouble.

"In all these manipulations on the arms there is danger of dislocating the shoulder joint, of separating the epiphysis at the upper end of the humerus, of fracturing the humerus, clavicle, or spine of the scapula, or of injuring nerves. The traction should, therefore, be made in the bend of the elbow. In cases where this method fails, division of the clavicle may be performed—cleidotomy—to diminish the size of the shoulder girdle.

(c) "Sometimes the retraction ring of the uterus may grasp the head tightly; sometimes the cervix may be closely retracted on the neck. This condition greatly endangers the life of the child, and delivery must be rapid. The patient should be deeply anesthetized, and traction made on the shoulders and mouth, or forceps should be applied." (*Jewett's Practice of Obstetrics.*)

8. The following tables (from Dorland's *Obstetrics*) give the main points to be looked for in a *differential diagnosis of extrauterine pregnancy*:

From *cornual pregnancy*:

Extrauterine Pregnancy.	Cornual Pregnancy.
Rupture is most prone to take place at some period during the first three months.	Rupture usually occurs between the third and sixth months.
The tumor exists to one or the other side of the uterus, and is usually distinct.	There may be but one tumor, this being dependent upon the degree of bifurcation.
The tumor is exceedingly sensitive and semi-elastic.	The tumor is not so sensitive, and presents the characteristics of a uterine tumor.
The round ligament may be felt attached to the uterus on the inner or uterine side of the gestation sac.	The round ligament is displaced outward and is attached to the external side of the gestation sac.
Examination of the removed specimen shows an absence of true decidual tissue.	True decidual tissue will be found surrounding the fetal membranes.

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Extrauterine Pregnancy.

In interstitial pregnancy the gestation sac communicates with the uterine cavity by the orifice of the Fallopian tube.

Cornual Pregnancy.

The two halves of the uterus are united by a muscular band.

From *pyosalpinx*:

Extrauterine Pregnancy.

The uterus is enlarged, with a soft cervix and the peculiar softening of the body that is present in pregnancy.

There is a history of sterility, with the signs of endometritis or salpingitis.

The tumor is small, exceedingly sensitive, but, as a rule, not firmly bound down in the pelvic cavity.

Rupture is likely to occur at some time during the first three months.

The usual clinical manifestations of pregnancy will be present.

Pyosalpinx with Indistinct History of Pregnancy.

The uterus is probably not enlarged, the cervix is not soft, and there is not the elastic feel that is present in pregnancy.

There is a history of acute attacks of peritonitis occurring at intervals after an attack of gonorrhea.

The tumor is large, moderately sensitive, firmly bound down in the pelvis, and surrounded by a mass of exuded lymph.

The history may have covered a period of months without the symptoms of rupture.

The clinical manifestations of pregnancy are absent or very indistinct.

From *intrauterine pregnancy with fibroid tumor*:

Extrauterine Pregnancy (Tubal Variety).

There is discovered to one side of the uterus a mass, rounded, exceedingly sensitive, and elastic or semi-fluctuating.

The uterus is enlarged, but not to a size proportionate to the period of gestation.

Intrauterine Pregnancy Complicated with Fibroid Tumor.

The mass may be rounded; more often it is nodulated, very hard, non-elastic, and non-fluctuating, and not sensitive to the touch.

The size of the uterus corresponds to, or is even in excess of, the time of gestation.

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Extrauterine Pregnancy (Tubal Variety).

The menstrual history is irregular, and there may be an early return of the show.

Rupture occurs at the usual time.

Pain is an early and prominent symptom.

Intrauterine Pregnancy Complicated with Fibroid Tumor.

Menstruation is likely to be suppressed.

No signs of rupture follow.

Pain develops only after the tumor has reached sufficient size to press upon the surrounding structures.

From lateral flexion of a pregnant uterus:

Extrauterine Pregnancy

The body and cervix of the enlarged uterus are generally in a straight vertical line.

The extrauterine gestation sac is in close proximity to the body of the uterus.

Anesthetization reveals the mass closely attached to the fundus and readily outlined.

The size of the uterus is much below that indicated by the duration of the pregnancy.

The menstrual history is irregular.

There is a history of severe abdominal pain and rectal tenesmus.

Intrauterine Pregnancy with Lateral Flexion of the Uterus.

The fundus lies to one side of the pelvis, with the cervix carried to the opposite side.

A deep sulcus may be felt between the fundus and the cervix.

Anesthetization reveals a normal condition of the appendage.

The size of the uterus corresponds to the period of the gestation.

Menstruation is suppressed.

Usually there is no pain other than a backache; there is no rectal tenesmus.

10. (a) *The uterine sound is contraindicated in:—*(1) The least suspicion of even the possibility of pregnancy; (2) menstruation; (3) acute endometritis; (4) malignant disease of the uterus or vagina; (5) acute pelvic inflammation.

(b) *The uterine curette is indicated in:—*(1). Retained

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secundines; (2) in some cases of puerperal sepsis; (3) in endometritis; (4) in some cases of carcinoma when hysterectomy is contraindicated; (5) for diagnostic purposes.

PRACTICE, PATHOLOGY, AND DIAGNOSIS.

1. By *ptomain poisoning* is meant poisoning by means of ptomains through the medium of the gastrointestinal canal.

The *chief poisonous ptomains* are:—Tyrotoxin, mytilotoxin, cholin, neurin, neuridin, putrescin, cadaverin, gadinin, muscarin, tetanin, typhotoxin.

The *general symptoms of ptomain poisoning* are:—Onset in less than twenty-four hours after the ingestion of the noxious "food," chilliness, vertigo, headache, thirst, abdominal pains, nausea, vomiting, diarrhea, cyanosis, rapid pulse, cutaneous eruption sometimes, subnormal temperature at times, convulsions.

2. **ARTERIOSCLEROSIS.** *Etiology:* Syphilis, alcoholism, gout, Bright's disease, overeating, and excessive muscular exertion. It is most liable to occur in old age.

Possible sequels are:—Thrombosis or cerebral hemorrhage, gangrene of the extremities, interstitial nephritis, angina pectoris, aneurysm, cardiac hypertrophy.

4. (a) *Direct vomiting* may be caused by:—Apomorphine, alcohol, inhalation of chloroform, uremia, the infectious and septic diseases, anemia, diabetes, Addison's disease, nephritis.

(b) *Reflex vomiting* may be caused by:—Tumor or abscess of the brain; cerebral hemorrhage, thrombosis, or embolism; meningitis; concussion or compression of the brain; emotional or hysterical causes; pregnancy; irritation of the fauces; worms; uterine, tubal, or ovarian disease.

5. *The symptoms and sequelæ of a non-compensating heart* are:—Dyspnea, hemoptysis, cough, chronic bronchial catarrh; congestion of the stomach, intestines, and liver; dyspepsia, gastritis, enlarged spleen, ascites; cyanosis; dropsy; scanty and albuminous urine, with casts; clubbed fingers; vertigo, headache, or syncope.

6.

Eczema.	Psoriasis.
1. Polymorphous in character.	1. Uniform in character.
2. Generally found on the flexor surfaces.	2. Generally found on the extensor surfaces.

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Eczema.	Psoriasis.
3. The patches are not sharply defined, but gradually merge into the surrounding healthy skin.	3. The patches are sharply defined.
4. Decided serous exudation.	4. Dry scales.
5. Marked itching and burning.	5. No marked itching and burning.
6. Healing begins at the periphery.	6. Healing begins in the center.

STATE BOARD EXAMINATION QUESTIONS.

DELAWARE STATE MEDICAL SOCIETY EXAMINING BOARD.

THERAPEUTICS.

1. What analogy exists between the nutrition of health, the disturbances of disease, and the action of remedies?
2. Give the origin of benzoin and menthol, with their therapeutical applications.
3. In uremic poisoning what remedies are required?
4. What is the physiological antagonism between belladonna and morphia?
5. What are the principal preparations used as anti-periodics?
6. Of what therapeutic value is amyl nitrate?
7. What respiratory stimulants exalt the functions of the respiratory center of the medulla?
8. For what is stramonium used, what are its physiological actions?
9. Give the preparations and doses of the mineral acids with their therapeutic effects.
10. Give the preparations of bismuth, how administered, and indications for use.

MATERIA MEDICA.

1. Give the preparations and classifications of phenacetin, somnal, and hydrogen dioxide.
2. What are the principal anthelmintics, mode of action?
3. Name twelve official alkaloids.
4. What are the official extracts, how obtained?
5. What is chrysarobin, where found and how applied?
6. Name the alkaloids of veratrum viride.

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7. What are the preparations of guaiacum, give physiological action?
8. Name six motor excitants and six motor depressants.
9. Name the preparations of iron, their doses and incompatibles.
10. What is picrotoxin, what combinatory action does it represent?

CHEMISTRY.

1. What is analysis, and synthesis?
2. What is the difference between physical and chemical action?
3. What are the essential ingredients in air? Is it a mixture or a chemical compound? Give proof.
4. What are the chemical properties of phosphorus?
5. What is Labarraque's Solution, and upon what does its disinfectant value depend?
6. What are the physical and chemical properties of ammonia, and how does it differ from other alkalies?
7. Give method of disinfection in detail—1st, with sulphur; 2d, with formaldehyde.
8. Which is the more efficient, and why?
9. What are the best tests for albumin and sugar in urine?
10. What is eucalyptol, and what are its uses in medical practice?

HYGIENE.

1. Will the destruction of offensive odors remove the conditions injurious to health?
2. In what way may the application of fertilizers affect the public health, and how can it be avoided?
3. What are the nitrogenous constituents of food, from whence derived, and what are their functions?
4. What is the period and source of infection and the necessary time of quarantine, in (a) smallpox, (b) scarlet fever, (c) diphtheria, and what do you understand by quarantine?
5. How would you manage an outbreak of contagion among school children? Answer in detail.
6. Describe a practical method for the disinfection of clothing, bedding, etc.
7. How would you provide for an infant who never has the breast available? Name food you would prefer, quantity you would advise, and frequency of feeding, according to age.
8. What general preventive measures would you recommend to stay the increase of tuberculosis?
9. Give the advantages or disadvantages of a state sanatorium for the treatment of tuberculosis. How should it be constructed and managed?

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10. What in detail is the duty of physicians in attendance upon infectious disease, to prevent its spread?

PATHOLOGY.

1. Give morbid anatomy of cerebral hemorrhage and name the common cause when it appears in early life.
2. How does the pathology of locomotor ataxia differ from that of ataxic paraplegia?
3. Define dementia and give its pathology.
4. State pathology of tinea circinata.
5. Define indicanuria, name its chief sources and the pathological conditions in which it is most usually found.
6. What is the pathological anatomy of pyelitis?
7. Name morbid anatomy of Hodgkin's disease.
8. Give pathology of biliary calculi.
9. State difference in pathology of catarrhal, ulcerative, and interstitial appendicitis.
10. How does tachycardia differ from bradycardia, and in what pathological conditions are they found respectively?

PHYSIOLOGY.

1. What is the function of the sudoriparous or sweat glands, where is the dominating sweat center located, and how is this excited to action?
2. Name the functions respectively of the anterior and the posterior roots of the spinal nerves.
3. Give functions of the liver and name the blood-vessels entering it.
4. In what way does the blood circulate through the heart?
5. What are the mechanical uses of saliva?
6. What gases have we in the stomach?
7. How do arteries differ from veins?
8. Are the movements of the lungs passive or active?
9. What changes are produced in the atmospheric air by respiration?
10. How does the function of an afferent or centripetal nerve differ from that of an efferent or centrifugal one?

SURGERY.

1. In ligating the superficial femoral artery at its lower third, what structures are severed and what are the anatomical relations?
2. Describe traumatic inflammation.
3. How and why are fever and delirium induced by physical injuries?
4. Bone fractures are how classified? Diagnose and treat a typical fracture of each variety.
5. Dislocations are how classified? Diagnose and treat a typical case of each variety.

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6. Explain reasons for preferring any special operation for amputation of both forearm and leg.
7. Explain method of procedure in operating for relief of fistula in ano.
8. In operating for relief of urinary calculi, what method would you use and why?
9. Differentiate hydrocele and chronic orchitis.
10. Deep seated pus cavities are how treated?

ANATOMY.

1. The first vertebra is how attached to the skull?
2. Give shape, size, formation, and articulation of first and second vertebra.
3. Give shape, approximate size, origin, and insertion of trapezius muscles.
4. Describe choroid plexus and situation of 4th ventricle of the brain.
5. Give origin and distribution of superior maxillary nerve.
6. Explain origin and distribution of brachial artery.
7. Give branches of internal carotid artery and their distribution.
8. Give structure, situation, and size of gall-bladder.
9. Give structure, formation, situation, and size of the gastrohepatic omentum.
10. Give location, shape, size, structure, and blood supply of the diaphragm.

OBSTETRICS.

1. Name the internal female organs of generation and state the functions of each.
2. How would you diagnose pregnancy in the early months, before quickening?
3. Mention conditions that may require induction of premature labor. How would you produce the same?
4. What is ectopic gestation? Name its varieties and state how its diagnosis may be established.
5. How would you proceed if called to a case of neglected shoulder presentation?
6. Give causes, pathology, and treatment of ophthalmia neonatorum. What is the great danger?
7. State the causes and give the management of post-partum hemorrhage.
8. State causes and treatment of mammary abscess.
9. Name the important diameters and measurements of (a) the female pelvis, (b) the fetal head.
10. Give the positive and doubtful signs of pregnancy, beginning with those you consider of the most importance.

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PRACTICE OF MEDICINE.

1. Mention the conditions that contraindicate general anesthesia.
2. Define arteriosclerosis. Give its etiology and state the age at which it is most liable to occur.
3. What are the symptoms and treatment of acute laryngitis in children?
4. Mention five possible complications of typhoid fever and your treatment of each.
5. Give symptoms and treatment of acute lobar pneumonia.
6. What is meant by immunity? In what ways may immunity be acquired?
7. Define neurasthenia. Give symptoms and treatment.
8. Differentiate tubercular arthritis from rheumatic arthritis.
9. State the symptoms and outline the treatment of (a) opium poisoning, (b) strychnine poisoning.
10. Give the symptoms and treatment of hydrophobia.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

DELAWARE STATE MEDICAL SOCIETY EXAMINING BOARD.

THERAPEUTICS.

2. *Benzoin* is a balsamic resin derived from the *Styrax Benzoin*. It is an antiseptic and disinfectant; it renders the urine acid; it is used in acute rheumatism, acute laryngitis, chronic bronchitis, and chronic cystitis.

Menthol is a stearopten derived from oil of peppermint. It is used in neuralgias and migraine, vomiting of pregnancy, gastralgia, and colic.

3. In *uremic poisoning* the first indication is to open up all the emunctories; measures must be taken to make the skin, kidneys, and bowels active; the hot pack, elaterin, pilocarpin are suitable agents. Then the respiratory and circulatory functions must be sustained; this can be done with strychnine and digitalis. If convulsions are present or impending, chloral or chloroform or bromides are indicated.

4. The physiological antagonism between *Belladonna* and *Morphia* is as follows: *Belladonna* (1) acts as an excitant and stimulant of the cerebrum; (2) produces dilatation of the pupil; (3) quickens the pulse; (4) first stimulates and then depresses the respiratory center; (5) decreases all the secretions, except urine.

Morphia (1) acts as a sedative on the cerebrum; (2)

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contracts the pupil; (3) slows the pulse; (4) does not at first depress respiration, but in overdose it paralyzes the respiratory center; (5) checks all the secretions except perspiration.

5. The principal *antiperiodics* are:—Cinchona bark and quinine, Warburg's tincture, arsenic, salicylic acid and the salicylates, eucalyptus, and iodine.

6. *Amyl nitrite* is used for the relief of angina pectoris, epilepsy, spasms, convulsions, whooping cough, asthma, laryngismus stridulus, strychnine poisoning, tetanus, and in threatened death from chloroform anesthesia.

7. Respiratory stimulants:—Strychnine, ammonia, digitalis, alcohol, ether, atropine, apomorphine, hydrocyanic acid, cold douche.

9. Mineral acids, with their preparations and doses:—Dilute sulphuric acid, 30 minims; aromatic sulphuric acid, 15 minims; dilute nitric acid, 30 minims; nitrohydrochloric acid, 3 minims; dilute nitrohydrochloric acid, 15 minims; dilute hydrochloric acid, 15 minims; dilute phosphoric acid, 30 minims; sulphurous acid, 30 minims; boric acid, 7 grains; (liquor antisepticus, 1 dram).

MATERIA MEDICA.

1. *Phenacetin* is an antipyretic and analgesic; there are no official preparations.

Somnal is a hypnotic; there are no official preparations.

Hydrogen dioxide is an antiseptic; preparation, aqua hydrogenii dioxidi.

2. *Anthelmintics* are agents which kill or expel worms inhabiting the intestinal tract.

Vermifuges (which expel the worms) are:—Scammony, jalap, and other purgatives.

Vermicides (which kill the worms) are:—Turpentine, male fern, kousso, pomegranate, santonine, quassia, tannin, spigelia, chenopodium.

3. *Twelve official alkaloids*:—Strychnine, atropine, quinine, morphine, codeine, cocaine, caffeine, physostigmine, hyoscyne, hyoscyamine, pilocarpine, sparteine.

4. *Fluid extracts* are liquid alcoholic preparations of vegetable drugs in which one cubic centimeter represents the medicinal properties of one gramme of the crude drug. They are obtained by percolation and partial evaporation with menstrua of alcohol (either pure or diluted).

5. *Chrysarobin* is a neutral principle obtained from Goa powder, which is found in the wood of *Vouacouppoua Ara-roba* in Brazil. It is applied externally in an ointment.

6. The alkaloids of *veratrum viride* are:—Veratrine, veratroidine, jervine, pseudojervine.

7. The preparations of *guaiacum* are:—Tincture of guaiac and ammoniated tincture of guaiac.

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Its action is:—diaphoretic, laxative, expectorant, and emmenagogue.

8. *Six motor excitants*:—Strychnine, digitalis, picrotoxin, pilocarpine, ergot, brucine.

Six motor depressants:—Alcohol, opium, aconite, chloral, belladonna, tobacco.

9. The preparations of iron, with their doses, are:—Reduced iron, 1 grain; ferrous sulphate, 3 grains; dried sulphate of iron, 2 grains; granulated ferrous sulphate, 3 grains; pills of ferrous carbonate, 2 pills; saccharated ferrous carbonate, 4 grains; syrup of ferrous iodide, 15 minims; pills of ferrous iodide, 2 pills; ferric chloride, 1 grain; solution of ferric chloride, 1½ minims; tincture of ferric chloride, 8 minims; Basham's mixture, 4 drams; solution of ferric subsulphate, 3 minims; ferric hydroxide with oxide of magnesium, 4 ounces; ferric ammonium sulphate, 7 grains; soluble ferric phosphate, 4 grains; tartarated iron, 4 grains; iron and ammonium citrate, 4 grains; iron and strychnine citrate, 2 grains; iron and ammonium tartrate, 4 grains; iron citrate, 4 grains; iron and quinine citrate, 4 grains; soluble iron and quinine citrate, 4 grains; pyrophosphate of iron, 4 grains; dialyzed iron, 10 to 30 minims.

Incompatibles:—Acids, acid salts, alkalies and their carbonates, and vegetable astringents.

10. Picrotoxin is a neutral principle found in the seeds of the *Anamirta paniculata*.

It represents the combined action of belladonna and nux vomica.

CHEMISTRY.

1. *Analysis* is the splitting up of a compound into its elements or into simpler compounds.

Synthesis is the building up of a compound from elements or from simpler compounds.

2. "A bar of soft iron may be made to emit light when heated, or sound when caused to vibrate, or magnetism when under the influence of an electric current. Under the influence of these *physical forces* the iron suffers no change in composition, and, on cessation of the action of the inciting force, the iron returns to its original condition. But if the iron be heated in an atmosphere of oxygen, both the iron and a part of the oxygen disappear, and a new substance, a new chemical species, is produced, having properties of its own, different from those of either the iron or the oxygen. In this case there has been *chemical action*, causing change of composition, as the new substance contains both iron and oxygen. The result of such action is, moreover, permanent, and the new product con-

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tinues to exist, until modified by some new manifestation of chemical action."—(Witthaus' *Manual of Chemistry*.)

3. The essential ingredients in air are:—Oxygen, nitrogen, carbon dioxide, water vapor, argon, and ammonia.

Air is a mixture, and not a chemical compound.

This is proved by the following facts:—(1) the composition is not always absolutely the same; (2) the proportion of the elements, oxygen and nitrogen, is not in any relation to their atomic weights; (3) when oxygen and nitrogen are brought together in the proper proportions, no chemical action occurs, and yet the resulting mixture has the properties of air.

4. *Chemical properties of phosphorus*:—Phosphorus has an atomic weight of 31 and a molecular weight of 124, there being four atoms to the molecule; it has a valence of three or five; it combines readily with oxygen, chlorine, bromine, and iodine; it is a good reducing agent; it is not acted on by hydrochloric or cold sulphuric acid, but is oxidized by nitric acid.

5. *Labarraque's solution*, or solution of chlorinated soda is an aqueous solution of several chlorine compounds of sodium.

Its disinfectant value depends upon the presence of the chlorine which can be liberated.

6. *Ammonia, Physical properties*:—A colorless gas, with a pungent and irritating odor, and a caustic taste; it is very soluble in water and in alcohol.

Chemical properties:—It combines directly with acids to form ammonium salts.

It differs from the other alkalies in being volatile, having a pungent irritating odor, being a gas, and in its action with acids.

9. Good tests for *albumin* in the urine are:—(1) the heat test, and (2) the nitric acid test.

Good tests for *sugar* in the urine are:—(1) Fehling's test, and (2) the fermentation test.

10. Eucalyptol is a neutral body obtained from oil of eucalyptus.

It is used for lotions and nasal applications, also in malaria, bronchitis, gonorrhoea; on ulcers it has a disinfectant and stimulating action.

HYGIENE.

1. The destruction of offensive odors does not necessarily remove the conditions injurious to health.

3. The nitrogenous constituents of food are derived chiefly from the flesh of animals, fish, fowl, milk, eggs, and certain vegetable products (wheat, oatmeal, peas, beans, etc.). The constituents and functions are shown in the

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following table adapted from Notter and Firth's *Hygiene*:

Nitrogenous Substances	Examples	Functions
1. All substances containing nitrogen, of a composition identical with, or nearly that of albumin; proportion of N to C being nearly as 2 to 7.	<i>Animal:</i> Albumin Fibrin Syntonin Myosin Globulin Casein Albumoses Peptones <i>Vegetable:</i> Glutin Legumin Albumoses	Formation and repair of tissues and fluids of the body. Regulation of the absorption and utilization of oxygen. May also form fat and carbohydrate, and yield energy sometimes. In most foods the above, both animal and vegetable, are largely converted into albumoses and peptones during digestion.
2. Substances containing a larger proportion of N are apparently less nutritious; proportion of N to C about 2 to 5.	Gelatin Ossein Chondrin Keratin	These perform the above functions less perfectly, or only under particular circumstances
3. Extractive matters, such as are contained in the juice of the flesh.	These substances appear essentially as regulators of digestion and assimilation, especially with reference to the gelatin group.

7. For an infant seven weeks old the following will do:—Cream, half an ounce; milk, ten drams; milk sugar, half a dram; a pinch of salt, and ten drams of water. This quantity should be given every two hours, except at night (from 11 P.M. to 5 A.M.).

PATHOLOGY.

2. In *locomotor ataxia* the degeneration of the posterior columns is most marked in the lumbar region; in *ataxic paraplegia* it is equally or more intense in the dorsal region. In *ataxic paraplegia* the lateral columns are also involved.

5. *Indicanuria* means the presence in the urine of an excess of indican. It is derived from the indol produced in intestinal putrefaction.

It is most usually found in gastric cancer, peritonitis, ileus, empyema, gangrene of the lungs.

6. The mucous membrane is congested and covered with mucus and desquamated epithelium. The inflammation (and pus) may extend into the substance of the kidney. When there is complete obstruction the calyces may be dilated, the kidney substance atrophied, and the entire kidney may become a sac of pus.

10. *Tachycardia* means increased frequency of the pulse. It is found in fevers, exophthalmic goiter, many forms of valvular disease of the heart, hemorrhage or tumor at the base of the brain, and after the ingestion of certain drugs.

Bradycardia means an abnormal slowness of the pulse.

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It is found in aortic stenosis, chronic myocarditis, during the puerperium, the convalescence from many fevers, hemorrhage or tumor of the brain causing increased intracranial pressure, myxedema, from certain poisons in the blood (as alcohol, tobacco, opium, and lead), and after the ingestion of certain drugs.

PHYSIOLOGY.

1. The function of the sudoriparous glands is the secretion of sweat. The location of the sweat center or centers has not been determined. There *may* be a dominating center in the medulla.

The center is excited to action (1) by direct action on the central nervous system, (2) by stimulation of certain afferent nerves, and (3) by changes in the composition or quantity of the blood.

2. The *anterior* roots of the spinal nerves are efferent and motor, and cause contraction of the muscles to which the nerves are distributed.

The *posterior* roots of the spinal nerves are afferent and sensory, and are distributed to the skin.

3. The functions of the liver are: (1) the secretion of bile, (2) the formation of glycogen, (3) the formation of urea and uric acid, (4) the manufacture of heat, and (5) the conversion of poisonous and harmful into inert material.

The blood-vessels entering the liver are the hepatic artery and portal vein.

5. The mechanical uses of saliva are: (1) to moisten the mouth, (2) to assist in the solution of the soluble portions of the food, and thus (3) to administer to the sense of taste, (4) to lubricate the bolus of food, and thus (5) to facilitate the acts of mastication and deglutition.

6. Gases which may be found in the stomach are:—Air, oxygen, nitrogen, hydrogen, carbon dioxide, marsh gas, and sulphuretted hydrogen.

7.

ARTERIES	VEINS
Generally carry arterial blood.....	Generally carry venous blood.
Carry blood from the heart	Carry blood to the heart.
Do not collapse when cut.....	Collapse when severed.
Are found contracted and empty after death.....	Are not found empty after death.
The middle coat is the thickest....	The external coat is the thickest.
Do not have valves.....	The medium-sized veins have valves.

8. The movements of the lungs are active in inspiration and passive in expiration.

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9. The changes produced in the air by respiration are:

	Inspired Air	Expired Air
Oxygen.....	.21 per cent.....	16.6 per cent.
Nitrogen.....	.79 per cent.....	79 per cent.
Carbon dioxide.....	.0.04 per cent.....	4.4 per cent.
Other gases.....	Rare.....	Often present.
Watery vapor.....	Variable.....	Saturated.
Temperature.....	Variable.....	That of body.
Volume.....	Varies.....	Diminished.
Bacteria.....	Always present.....	None.
Dust.....	Always present.....	None.

10. Efferent or centrifugal nerves carry impulses away from the nerve centers. Afferent or centripetal nerves carry impulses to the nerve centers.

SURGERY.

1. In ligating the superficial femoral artery at its lower third the following structures are severed:—Skin, superficial fascia, fascia lata, fibres of sartorius, and the aponeurotic roof of Hunter's canal.

The anatomic relations of the artery here are:—*Anteriorly*, the structures just named and the internal cutaneous and long saphenous nerves; *posteriorly*, the junction of the vastus internus with the adductor longus and magnus, femoral vein; *externally*, vastus internus and femoral vein; *internally*, adductor longus and magnus.

9. In *hydrocele* the swelling is first noticed at the lowest part of the scrotum, and it increases in size slowly; it is tense, smooth, and fluctuates; there is no pain and no symptoms of inflammation; *it is translucent*.

In *orchitis* the swelling comes on more rapidly; it is very painful and also tender to the touch; the skin over the affected gland is red and shiny; *it is not translucent*.

OBSTETRICS.

3. Conditions that may require the induction of premature labor:—(1) Certain pelvic deformities, (2) placenta prævia, (3) pernicious anemia, (4) toxemia of pregnancy, (5) habitual death of the fetus toward the end of pregnancy, (6) hydatidiform mole.

4. Ectopic gestation is a pregnancy in which the ovum is developed outside of the uterine cavity.

Varieties:—Ovarian, tubal, interstitial, abdominal.

Diagnosis:—"When extrauterine pregnancy exists there are: (1) The general and reflex symptoms of pregnancy; they have often come on after an uncertain period of sterility; nausea and vomiting appear aggravated. (2) Then comes a disordered menstruation, especially metror-

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rhagia, accompanied with gushes of blood, and with pelvic pain coincident with the above symptoms of pregnancy; pains are often very severe, with marked tenderness within the pelvis; such symptoms are highly suggestive. (3) There is the presence of a pelvic tumor characterized as a tense cyst, sensitive to the touch, actively pulsating; this tumor has a steady and progressive growth. In the first two months it has the size of a pigeon's egg; in the third month it has the size of a hen's egg; in the fourth month it has the size of two fists. (4) The os uteri is patulous; the uterus is displaced, but is slightly enlarged and empty. (5) Symptoms No. 2 may be absent until the end of the third month, when suddenly they become severe, with spasmodic pains, followed by the general symptoms of collapse. (6) Expulsion of the decidua, in part or whole. Nos. 1 and 2 are *presumptive signs*; Nos. 3 and 4 are *probable signs*; Nos. 5 and 6 are *positive signs*." (*American Text-Book of Obstetrics*.)

9. (a) The diameters and measurements of the female pelvis are easily remembered from the following table:

	ANTERO-POSTERIOR	OBLIQUE	TRANSVERSE
Brim.....	4 inches.....	4½ inches	5 inches
Mid-plane.....	4½ ".....	4½ "	4½ "
Outlet.....	5 ".....	4½ "	4 "

(b) The fetal head has the following diameters: Occipito-frontal, occipito-mental, bitemporal, biparietal, suboccipito-bregmatic, trachelo-bregmatic, and mento-bregmatic. Of these, the occipito-frontal is 4 1-2 inches, the occipito-mental is 5 1-2 inches, and all the others are approximately 3 1-2 inches.

10. *Positive signs of pregnancy*:—(1) hearing the fetal heart sound; (2) active movements of the fetus; (3) ballotement; (4) outlining the fetus in whole or part by palpation; and (5) the umbilical or funic souffle.

Doubtful signs of pregnancy:—(1) progressive enlargement of the uterus; (2) Hegar's sign; (3) Braxton Hick's sign; (4) uterine murmur; (5) cessation of menstruation; (6) changes in the breasts; (7) discoloration of the vagina and cervix; (8) pigmentation and striæ; (9) morning sickness.

PRACTICE OF MEDICINE.

1. The following contraindications for ether and chloroform are from Hare's *Practical Therapeutics*: "Ether should not be used by inhalation in bronchitis or acute nephritis, because of its irritant properties; in peritonitis

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or gastritis, because it is apt to induce vomiting; in aneurysm or in the presence of marked vascular atheroma, because it may rupture a blood-vessel by raising arterial pressure; nor in diabetes, lest it produce diabetic coma; and if anemia is present and an examination of the blood shows that the hemoglobin is below 50 per cent., the use of the drug should be avoided if possible.

"Chloroform is not to be used in cases of fatty heart or dilatation of the heart, in those with a known idiosyncrasy, nor in the so-called lymphatic persons with overgrowth of lymphoid tissues, as, for example, adenoids. In the latter case it is particularly apt to cause sudden death. In valvular disease of the heart chloroform may be used with caution, although ether is preferable. Given a case of valvular disease that must be subjected to operation, the chances are bettered with an anesthetic than without it, as the pain and mental shock are worse for the heart than is the anesthetic."

2. *Arteriosclerosis* is a condition in which the walls of an artery, especially the intima, become hard, dry, and thickened.

Etiology:—Syphilis, alcoholism, gout, Bright's disease, overeating, and excessive muscular gout. It is most liable to occur in old age.

6. Immunity is the power of resistance of cells and tissues to the action of pathogenic bacteria.

Immunity may be acquired by:—(1) a previous attack of the disease; (2) inoculation, with small quantities of bacteria, so as to produce a mild attack of the disease; (3) vaccination; (4) the introduction of antitoxins; (5) the introduction of the toxins of the bacteria.

9. *Opium poisoning: Symptoms*:—In opium poisoning there may be three stages: (1) a period of excitement, in which the patient is active, talkative, and has hallucinations; (2) a period of drowsiness, in which the patient is sleepy, but may be aroused; his face is pale, lips livid, pupils contracted; this passes into (3) the stage of coma, from which the patient cannot be aroused; the reflexes are abolished, the pupils are very contracted, the pulse is slow and irregular, and the respirations are infrequent and shallow.

Treatment consists in washing out the stomach, preferably with a dilute solution of potassium permanganate; ambulatory treatment, to keep the patient awake; artificial respiration is indicated, and strong coffee should be administered by the mouth or rectum; the bladder should be emptied by the catheter.

Strychnine poisoning: Symptoms:—"Strychnine produces a sense of suffocation, thirst, tetanic spasms, usually opis-

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thotonos, sometimes emprosthotonos, occasionally vomiting, contraction of the pupils during the spasms, and death, either by asphyxia during a paroxysm, or by exhaustion during a remission. The symptoms appear in from a few minutes to an hour after taking the poison, usually in less than twenty minutes; and death in from five to six hours, usually within two hours.

"Treatment:—The convulsions are to be arrested or mitigated by bringing the patient under the influence of chloral or chloroform as rapidly as possible; the stomach is to be washed out, and the patient is to be kept as quiet as possible." (Witthaus' *Essentials of Chemistry*.)

STATE BOARD EXAMINATION QUESTIONS.

FLORIDA BOARD OF MEDICAL EXAMINERS.

ANATOMY.

1. Describe the humerus.
2. Describe the hip-joint.
3. Give a general description of the lungs.
4. Locate and describe the spleen.
5. What is the diaphragm? Name the principal openings in the diaphragm.
6. What is the circle of Willis.
7. Describe the muscles of the eyeball and give their nerve supply.
8. Describe the pons Varolii.

PHYSIOLOGY.

1. What is the mode of production of heat in the body.
2. State the function of the retina.
3. What do you understand by blood pressure?
4. How is the sensation of pain produced?
5. Describe the physiology of rectal feeding.
6. How are the vocal sounds produced?
7. What are the functions of the pancreas?
8. Describe the pons Varolii.
9. Describe the normal heart sounds.
10. Name the solids in the urine and state the approximate amount of each voided daily by an adult.

SURGERY.

1. Define and differentiate between bacteria, ptomaines and toxins. Name three antiseptics which will destroy pyogenic bacteria.
2. Describe, briefly, inflammation, cellulitis, suppuration and gangrene.
3. Give the treatment of syphilis, beginning with the primary lesion and following it out to a cure.
4. Describe synovitis, arthritis, and ankylosis.

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5. Name five varieties of tumors, and differentiate between a fibrous and a fatty tumor.
6. Give the diagnosis and treatment of fracture of the neck of the femur.
7. Name the various dislocations of the shoulder-joint.
8. Give the usual cause, diagnosis, and treatment of hip-joint disease in children.
9. What symptoms would be diagnostic of an abscess of the antrum of Highmore? How would you enter this cavity for the purpose of drainage and irrigation?
10. How would you make a differential diagnosis between alcoholic, apoplectic, and uremic coma?

GYNECOLOGY.

1. Why are girls never hysterical before puberty?
2. Explain difference between hysteria and catalepsy.
3. Explain symptoms and determine a positive diagnosis of retroversion of the uterus.
4. What is menorrhagia? Explain causes and outline treatment.
5. Give in full your treatment of gonorrheal endometritis.
6. What are the immediate and remote results of laceration of cervix uteri not repaired?
7. What are the most common kinds of ovarian tumors, and which attain to great size?
8. What conditions justify ovariectomy?
9. Give symptoms and treatment of cystitis.
10. Give symptoms and treatment of carcinoma mammae.

THERAPEUTICS.

1. Acids. Into what classes divided, and indications for their use?
2. Scilla. In what class of remedial agents does it belong? Official preparations and doses of the same.
3. Digitalis. State when in your opinion it is contra-indicated, and name the agents with which it is incompatible.
4. Give child (1 year), and adult, dose of acetanilid, tincture of opium, tincture of gelsemium.
5. Strophanthus. Official preparation and dose. In what class of cases used.
6. Anthelmintics. Name the ones most generally used, and in what doses.
7. Opium. Name its alkaloids. Outline treatment in a case of acute opium poisoning.
8. What are antidotes, and into what classes would you divide them?

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9. Antipyretics. For what do you use them? Name the ones you generally use.

10. Name a drug which when taken internally causes contraction of the pupil of the eye, and one when applied locally.

OBSTETRICS.

1. Describe the anatomic differences, not including the sexual organs, between the male and the female figure.

2. Give an anatomic description of the genital organs of the female and state the function of each organ.

3. On what signs may a diagnosis of occipito-posterior position be based?

4. Make a diagnosis of breech presentation and state the principles that should govern its management.

5. Mention the most reliable signs of pregnancy before the fourth month.

6. What conditions justify the induction of abortion? Mention the methods that may be employed.

7. What is pathology of puerperal mastitis? State how puerperal mastitis should be treated.

8. Describe the nature, causes, and treatment of puerperal eclampsia.

9. Define version, mention its varieties and describe its performance.

10. What is ectopic pregnancy? Mention the dangers of ectopic pregnancy, and state how it should be treated.

CHEMISTRY.

1. State the law of multiple proportions.

2. Give the formula for ammonia, and give physical and chemical properties of ammonia water.

3. How does nitric acid act on animal matter, and what are its properties generally?

4. What acid is used in preparing sulphite salts?

5. Describe three reliable tests for albumin in the urine.

6. Give antidotes for poisoning by match heads.

7. Describe treatment for a case of poisoning by rat poison.

8. Describe treatment for poisoning by bichloride tablets.

9. What common antidotes are usually found around the house for caustic potash poisoning?

10. What is the dose of apomorphine, how administered and for what purposes?

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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

FLORIDA BOARD OF MEDICAL EXAMINERS.

PHYSIOLOGY.

1. *Heat is produced in the body, by:* (1) Muscular action; (2) the action of the glands, chiefly of the liver; (3) the food and drink ingested; (4) the brain; (5) the heart; and (6) the thermogenetic centers in the brain, pons, medulla, and spinal cord.

2. *The function of the retina, is:* To receive the image of objects and cause nervous stimuli to convey the same to the brain.

3. By the term *blood pressure* is meant the pressure on the blood due to (1) the ventricular systole, (2) the elasticity of the walls of the arteries, and (3) the resistance in the capillaries.

4. Pain is due to excessive stimulation of the sensory nerves, including those of special sensation, particularly those concerned with touch and temperature. It is, however, believed by some that pain is a distinct sensation, independent of other sensations.

5. "That all mucous membranes are capable of absorbing certain materials from their surfaces and passing them into the blood-vessels or lymphatics has long been recognized; but it is only of comparatively recent years that this knowledge has been applied extensively to the purpose of nourishing patients by means of the rectum, and the fact is now established that sufficient aliment may be absorbed from the mucous membrane of the rectum or sigmoid flexure alone to sustain life for a considerable period, amounting in some cases from four to seven weeks. Moreover, the rectum may be utilized for accessory feeding for many cases in which the stomach is able to digest some food, but not in sufficient quantity to prevent emaciation. Whenever rectal food enemata are employed certain principles should be observed: (1) The rectal surface must be cleansed from all mucus and feces. (2) The irrigation of the rectum should be allayed as far as possible. (3) The quantity and quality of food thus administered should be so regulated as to avoid exciting peristalsis, and yet allow of the complete absorption of one injection before another is given." — (Thompson's *Practical Dietetics*.)

6. The *Vocal Sounds* are produced by an expiratory blast of air being forced through the narrow chink between the true vocal cords. The current of air sets these vocal cords in vibration; and these vibrations are communicated

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to the air in the upper air passages. The pitch of the sound produced depends upon the rapidity with which the vocal cords vibrate.

7. The *functions of the pancreas* are: (a) The secretion of the pancreatic juice, which (1) changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; (2) converts starch into maltose; (3) emulsifies and saponifies fats; and (4) causes milk to curdle.

(b) The manufacture of an internal secretion.

The *ferments secreted by the pancreas* are: Trypsin, amylpsin, steapsin, and a milk-curdling ferment.

8. The *physical properties of blood*: Fluid, somewhat viscid, red, specific gravity from 1055 to 1062, alkaline reaction, saltish taste, characteristic odor, variable temperature (average about 100° F.).

The *constituents of the blood* are plasma and corpuscles. The *plasma* consists of water and solids (proteids, extractives, and inorganic salts). The *red corpuscles* consist of water and solids (hemoglobin, proteids, fat, and inorganic salts). The *white corpuscles* consist of water and solids (proteid, leuconuclein, lecithin, histon, etc.).

The *red blood corpuscles* are biconcave discs, about 1-3200 of an inch in diameter; they are nonnucleated, and there are about 4,500,000 or 5,000,000 of them in each cubic millimeter of blood. They are elastic and soft, and their shape is changed by pressure, but is promptly regained on the removal of the pressure. Their color is yellowish. They contain hemoglobin.

Their *function* is to carry oxygen from the lungs to the tissues.

The white blood cells are spheroidal masses, varying in size, having no cell wall, and containing one or more nuclei; there are about 7,000 to 10,000 of them in each cubic millimeter of blood. They differ much in appearance, and are divided into (1) small mononuclear leucocytes, or lymphocytes, (2) large mononuclear, (3) transitional, (4) polynuclear, or polymorphonuclear, or neutrophile, and (5) eosinophile. They are all more or less granular, particularly the last two varieties named. They are probably formed in the spleen, lymphatic glands, and lymphoid tissues. Their fate is uncertain; it has been asserted that they are converted into red blood cells; they play a part in the formation of fibrin ferment; they are sometimes converted into pus cells. Their functions are (1) to serve as a protection to the body from the incursions of pathogenic microorganisms; (2) they take some part in the process of the coagulation of the blood;

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(3) they aid in the absorption of fats and peptones from the intestine, and (4) they help to maintain the proper proteid content of the blood plasma.

There are also *platelets*, which are very small, colorless, irregular shaped bodies; they are about one fourth the diameter of a red corpuscle. Their function is not determined; it is possible that they take some part in the coagulation of the blood. In number they vary from about 200,000 to more than 500,000 in each cubic millimeter of blood.

Plasma conveys nutriment to the tissue; it holds in solution the carbon dioxide and water which it receives from the tissues; and takes them to be eliminated by the lungs, kidneys, and skin; it also holds in solution urea and other nitrogenous substances that are taken to and excreted by the liver or kidneys.

10.

SOLIDS IN THE URINE.	VOIDED PER DAY.
Organic—	
Urea.....	about 500 grains.
Uric acid.....	about 10 grains.
Hippuric acid	about 6 grains.
Creatinin.....	about 12 grains.
Extractives.....	about 150 grains.
Inorganic—	
Sodium chloride.....	about 150 grains.
Phosphoric acid.....	about 37 grains.
Sulphuric acid	about 24 grains.
Oxides of calcium, magnesium, sodium, and potassium	about 20 grains.

SURGERY.

1. *Bacteria* are unicellular vegetable organisms, non-nucleated, composed of protoplasm, exist nearly everywhere, and *may be* the cause of disease.

Ptomaines are alkaloids produced by the action of bacteria on dead animal matter.

Toxins are nonalbuminous, poisonous substances, excreted by bacteria.

Three antiseptics which will destroy pyogenic bacteria:—bichloride of mercury, carbolic acid, mercuric iodide.

7. The *various dislocations of the shoulder-joint* are:—(1) Subcoracoid—forward, inward and downward. (2) Subglenoid—downward, forward, and inward. (3) Subspinous—backward, inward, and downward. (4) Subclavicular—forward, inward, and upward.

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8. HIP-JOINT DISEASE IN CHILDREN.—The *usual cause* is tuberculosis.

The *early symptoms of the disease* are: Night cries; lameness in the morning; a slight limp; tendency to become tired on slight exertion; wasting; spasm; pain; swelling; and deformity (either real or apparent).

The *diagnosis* is to be made from: (1) *Growing pains*, which are not increased by movement. (2) *Sacroiliac disease*, in which the pain is not increased by movement of the hip-joint. (3) *Congenital dislocation of the hip*, in which there is great mobility of the joint, and no pain on pressure. (4) *Spinal caries* and *Psoas abscess*, in which there are evidences of disease of the vertebræ; and the pus is located in the groin, external to the femoral vessels. Other conditions from which it may be necessary to diagnose hip-joint disease are: Infantile paralysis; lordosis, from rickets; and rheumatism.

Treatment: Complete rest in bed; extension, using just enough weight to prevent the muscles from contracting; fresh air, tonics, and good food; immobilization by means of plaster-of-Paris dressing; iodoform injections. If these fail, resection of the joint may be necessary.

9. Abscess of the antrum of Highmore, may be *diagnosed* by: (1) The presence of pus flowing over the middle turbinate bone, when the patient has his head bent downward and forward; after being wiped away, pus still continues to flow. (2) Transillumination will show a dark shadow. (3) Aspiration through the canine fossa.

The antrum can be entered for the purpose of drainage and irrigation: (1) through the canine fossa; (2) through the socket of the first or second bicuspid tooth.

10. In *alcoholic coma*:—The patient can generally be aroused; the coma is not, as a rule, complete; the face may be flushed; the pupils are normal or dilated; the respirations are normal in frequency, but deep; the skin is cool and moist, and the body temperature may be below normal.

In *apoplectic coma*:—There is generally paralysis of the head and upper limbs; and in left-side lesions there may be aphasia; the pulse is slow and full; the respirations are at first slow, regular, and stertorous, later on becoming of the Cheyne-Stokes type.

In *uremic coma*:—The coma is deep; the pulse slow; the respirations frequent and irregular; the urine shows the presence of albumin and casts, with a diminished output of urea; there may be a urinous odor to the breath.

GYNECOLOGY.

4. *Menorrhagia* is a condition characterized by

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excessive loss of blood during the menstrual period.

Causes: Tumors, uterine displacements, endometritis, subinvolution of the uterus, lacerations and cystic degeneration of the cervix, tubal and ovarian diseases.

Treatment: Remove the cause, if possible; treat abnormal conditions that are present; vaginal douches, tampons, and curettage have all been recommended; also ergot, hamamelis, hydrastis, and virburnum prunifolium.

5. The *treatment of gonorrheal endometritis* consists in dilating the cervix, curetting the uterus, washing out the uterine cavity with an antiseptic solution, and swabbing with carbolic acid or tincture of iodine.

6. Laceration of the cervix may cause hypertrophy, elongation, sclerosis, cystic degeneration, or carcinoma of the cervix; subinvolution, or displacements of the uterus, also endometritis. Other results may be pain on walking, on defecation, or during coitus; sterility or abortion; headaches, backache, neuralgic pains, neurasthenia, indigestion, constipation.

7. The *most common ovarian tumors* are: Cystic tumors; then sarcoma, carcinoma, endothelioma, myoma, fibroma; the three latter are somewhat rare.

The cystic tumors, sarcoma, and carcinoma may attain to great size.

8. The *indications for ovariectomy* are given by Treves as follows: Ovarian tumors and cysts; persistent hyperemia of the ovary; ovaritis; amenorrhea, attended with hystero-epilepsy; occlusion, or absence of uterus or vagina, with violent molimen; certain cases of uterine tumor; neuralgia of the ovary; some cases of mania, epilepsy, and hysteria.

9. *CYSTITIS.—Symptoms:* Frequent micturition; pain; bladder irritability and tenesmus; the urine may be alkaline and turbid, and may contain blood, pus, mucus, or bacteria; the patient may also experience chills and fever.

Treatment: Rest in bed; the imbibition of plenty of milk and water, and the avoidance of all highly seasoned food; laxatives; diuretics; sitz-bath; irrigation of the bladder with an antiseptic solution; hot fomentation and vaginal douches are often helpful; sometimes intravesical medication is necessary.

THERAPEUTICS.

1. Acids are classified as: (1) Mineral, and (2) Vegetable or as (1) Inorganic, and (2) Organic.

2. Scilla may be classed as an expectorant, an emetic, and as a diuretic.

The official preparations and doses are: Fluidextractum scillæ, ℥ij; tinctura scillæ, ℥xv; acetum scillæ, ℥xv;

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syrupus scillæ, ℞xxx; syrupus scillæ compositus, ℞xxx.

3. *Digitalis is contraindicated:* (1) When it produces precordial distress; (2) if it makes the pulse irregular; (3) in valvular lesions accompanied with compensatory hypertrophy, or when such hypertrophy is taking place; (4) in aortic lesions, generally; (5) in fatty heart; (6) in aneurysm and cerebral endarteritis.

Digitalis is incompatible with: Cinchona, lead acetate, iron sulphate, and the tincture of the chloride of iron.

4.

	DOSE FOR CHILD OF ONE YEAR.	DOSE FOR ADULT.
Acetanilid.....	Should not be given.	gr. iv.
Tincture of opium.....	℞ss; but the camphorated tincture had better be given, ℞v.	℞ viij.
Tincture of gelsemium	℞ss.	℞ viij.

5. *Official preparations and doses of Strophanthus:* Tinctura strophanthi, ℞vij; strophanthinum, gr. 1/200.

Strophanthus is used as a cardiac stimulant, in cardiac dyspnea, in several forms of cardiac disease, and nephritis, in pulmonary edema, hysteria, chlorosis, palpitation, and tumultuous heart action.

6. *The most generally used Anthelmintics* are: Aspidium; oleoresina aspidii, gr. xxx. Granatum; Pelletierina tannas, gr. xij. Pepo; ℥jss. Santonin; gr. j. Quassia; gr. xx. Thymol; gr. xij.

7. *The most important alkaloids of Opium* are: Morphine, codeine, narcotine, thebaine, narceine, papaverine.

Treatment of acute opium poisoning: "Wash out the stomach with a dilute solution of potassium permanganate, leaving about 500 c.c. in the stomach, and in maintaining the respiration. In the first or second stage the 'ambulatory treatment' should be adopted to prevent, if possible, the establishment of the third stage. If this stage develop, the main reliance is to be placed in maintaining the respiration by artificial methods, until the poison has been eliminated. Strong coffee, or caffen, by the mouth or rectum, are of benefit. The same cannot be said of atropin. The urine should be drawn by the catheter." (Witthaus' *Essentials of Chemistry*.)

8. *Antidotes* are agents given to counteract the effects of a poison. They may be divided into two classes:

Chemical antidotes act as such by uniting chemically with

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the poison, and thus converting it into a harmless or insoluble compound.

Physiological antidotes act as such by combating the physiological action of the poison.

9. *Antipyretics* are used to reduce the body temperature when it is abnormally high.

Antipyretics generally used are: Cold water, ice, aconite, quinine, acetanilid, antipyrin, acetphenetidin, digitalis.

10. A drug which when taken internally causes contraction of the pupil of the eye: morphine.

One which acts similarly when applied locally: eserine.

OBSTETRICS.

1. The anatomic differences (not including the sexual organs), between the male and female figure are: In the male, the bones are stronger, heavier, with prominences and ridges more pronounced; the sternum is longer; the pelvis shows marked differences, notably in the subpubic angle, which is from 75° to 80° in the male and from 90° to 100° in the female; the thyroid foramen is oval in the male and triangular in the female. The female has more subcutaneous fat, hence the body is more rounded. There is less hair on the female body, notably on the face, chest, limbs, and abdomen; the pubic hair does not grow upward toward the umbilicus as in the male; the hair on the head is characteristically different. In the female the larynx and waist are smaller than in the male; while the hips are wider and the breasts larger.

3. A *diagnosis of occipito-posterior position* may be based on: Finding the sagittal suture in the oblique diameter of the pelvis, the posterior fontanelle in the posterior half of the pelvis, the anterior fontanelle is easily accessible; the fetal heart sounds are heard far back in the flank, between the ribs and the crest of the ilium; the fetal head may be felt above the pelvic brim, and the fetal small parts are felt through the anterior abdominal walls of the mother, while the fetal back is not felt.

5. The *most reliable signs of pregnancy before the fourth month*, are: Suppression of the menses, nausea, softened cervix and lower uterine segment, and enlarged breasts with darkened areola.

6. Conditions that justify the induction of premature labor: (1) Certain pelvic deformities; (2) placenta prævia; (3) pernicious anemia; (4) toxemia of pregnancy; (5) habitual death of a fetus toward the end of pregnancy; (6) hydatidiform mole; (7) habitually large fetal head.

The methods that may be employed, are: Partial dilatation of the cervix and the introduction within the cervix (and vagina) of a tamponade of sterile gauze; (2)

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dilatation of the cervix; (3) puncturing the membranes; (4) introduction of a soft rubber bougie into the uterus; (5) intrauterine injection of glycerin, water, or some other fluid.

8. *Puerperal eclampsia* is an acute morbid condition, occurring during pregnancy, labor, or the puerperal state, and is characterized by tonic and clonic convulsions, which affect first the voluntary and then the involuntary muscles; there is total loss of consciousness, which tends either to coma or to sleep, and the condition may terminate in recovery or death.

The line of *treatment* as laid down by Edgar is as follows: For *preventive treatment*: (1) The amount of nitrogenous food should be diminished to a minimum; (2) the production and absorption of poisonous materials in the intestines and body tissues should be limited and their elimination should be aided by improving the action of the bowels, the kidneys, the liver, the skin, and the lungs; (3) the source of the fetal metabolic products and the peripheral irritation in the uterus should, if necessary, be removed by evacuating that organ.

The *curative treatment* includes: (1) Controlling the convulsions (by chloroform, veratrum, or chloral); (2) elimination of the poison or poisons which are presumed to cause the convulsions; (3) emptying the uterus under deep anesthesia, by some method that is rapid and that will cause as little injury to the woman as possible.

9. *Version*, or turning, is a procedure by which some part of the fetus other than that originally presenting is brought to the superior strait of the pelvis.

The *varieties* are: (1) Cephalic, in which the head is brought down; (2) podalic, in which the (breech or) feet are brought down.

10. Ectopic pregnancy is a pregnancy in which the ovum is developed outside of the uterine cavity.

Its *dangers* are: Rupture of the gestation sac, hemorrhage, shock, pelvic hematocele, peritonitis, sepsis, and death.

Treatment consists in a laparotomy, and removal of the gestation sac as soon as the condition is recognized.

CHEMISTRY.

1. The *law of multiple proportions*: When two elements, *A* and *B*, unite with each other to form more than one compound, the various weights of *B* which combine with a fixed weight of *A*, are simple multiples of the smallest weight of *B* so combining.

2. The formula for ammonia is NH_3 .

Ammonia water is a colorless liquid having the charac-

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teristic odor of ammonia. It imparts a blue color to litmus paper. If a glass rod moistened with hydrochloric acid is held over ammonia water, dense white fumes are evolved. Ammonia water when added to ordinary water makes a good cleansing agent.

3. Nitric acid acts very energetically on animal matter; it decomposes the same, and turns proteid substances yellow. Nitric acid is a colorless, fuming liquid, with a penetrating and irritating odor, and very sour taste; it is strongly acid in reaction; is a powerful oxidizing agent, and reacts readily with most metals to form nitrates; on exposure to the air and light it becomes yellow, and is decomposed into NO_2 , H_2O , and O .

4. The acid used in preparing sulphite salts is sulphurous acid.

5. Three reliable tests for albumin in the urine:

"The urine must be perfectly clear." If not so, it is to be filtered, and if this does not render it transparent, it is to be treated with a few drops of magnesia mixture and again filtered."

I.—*The heat test*: "The reaction is first observed. If it be acid, the urine is simply heated to near the boiling point. If the urine be neutral or alkaline, it is rendered faintly acid by the addition of dilute acetic acid, and heated. If albumin be present, a coagulum is formed, varying in quantity from a faint cloudiness to entire solidification, according to the quantity of albumin present. The coagulum is not redissolved upon the addition of HNO_3 ."

II.—*Heller's modification of the nitric acid test*: "Place in a test tube a layer of HNO_3 about 2 centim. in thickness; then, with a pipette, carefully float upon the surface of this a layer of the urine in such a manner that the liquids do not mix. If albumin be present, a cloudy ring appears at the point of junction of the two layers, the borders of the cloud being sharply defined. A cloudy ring may be formed by the presence of an excess of urates, but in this case it is not at, but above, the point of junction of the layers, and its upper border is not sharply defined, but fades off gradually."

III.—*The trichloroacetic acid test*: "It is more delicate than Heller's test. Add a crystal of trichloroacetic acid to the suspected urine; the acid dissolves, forming a layer underneath the urine. A white band at the junction shows the presence of albumin." (Witthaus' *Essentials of Chemistry*.)

6. In poisoning by match heads, give an emetic such as copper sulphate or apomorphine hydrochloride; then old French oil of turpentine should be administered; avoid

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giving oils and fats; a weak solution of potassium permanganate has also been recommended.

7. Rat poison means poisoning by either phosphorus or arsenic. In the former case, the treatment is as just described in answer to question 6.

In poisoning by arsenic, the stomach should be washed out; an emetic such as copper sulphate or apomorphine hydrochloride should be given; and the antidote, freshly prepared solution of ferric hydroxide should be administered.

8. In poisoning by bichloride tablets, administer white of egg in moderate quantity, and follow this with an emetic (apomorphine hydrochloride).

9. Common antidotes for caustic potash poisoning, usually found around the house, are vinegar and lemon juice.

10. The dose of apomorphine hydrochloride is gr. 1/10. It is administered hypodermically.

It is used as an emetic.

STATE BOARD EXAMINATION QUESTIONS.

REGULAR BOARD OF MEDICAL EXAMINERS, STATE OF GEORGIA.

CHEMISTRY.

1. Give the chemical name of water, its formula, and its composition by weight and volume.

2. Give the chemical name of white arsenic. Give the names of three preparations of arsenic used in medicine. What salt of iron is an antidote for arsenic poisoning?

3. Give the chemical and pharmaceutical names and formulas of two compounds of mercury and chlorine commonly used in medicine.

4. Differentiate between chemical and physiological antidotes.

5. Give a good test for indican in the urine. What is the clinical significance of indican in the urine?

ANATOMY.

1. Give the divisions of the vertebral column. (a) Describe one vertebra under each division. (b) Describe typical rib.

2. Give anatomy of shoulder joint.

3. Bound triangles of the neck. Give contents of each. (Draw a diagram.) (a) Give origin and insertion of (1) Latissimus dorsi, (2) Pectoralis major, (3) Triceps, (4) Supinator longus.

4. Give anatomical relations of the liver.

5. Describe brachial plexus.

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SURGERY.

1. Name the varieties of fracture. (a) State the cardinal principles in the treatment of fractures.
2. Give diagnosis of hydrocele and best method of operating for its cure.
3. What is intussusception? (a) Describe an operation for intestinal anastomosis.
4. State best method for radical cure of varicocele.
5. Describe an operation for the removal of the mammary gland.

MATERIA MEDICA AND THERAPEUTICS.

1. Name the most commonly prescribed coal tar derivatives and their therapeutic uses and dangers.
2. Source of opium. Name four of the most important preparations and their therapeutic uses.
3. Source of quinine, indications and contraindications for its uses.
4. Define escharotic and name one or more and their mode of action.
5. Write prescription for chronic malarial poisoning.

OBSTETRICS AND DISEASES OF CHILDREN.

1. What diseases in the mother are liable to injure the fetus *in utero*?
2. What structures compose the fully developed umbilical cord?
3. What are the causes of labor at full term?
4. What principal dangers may arise after delivery is completed, and how should we guard against them?
5. Cause and treatment of post-partum hemorrhage.

PHYSIOLOGY.

1. What is the difference between mucous membranes and serous membranes, anatomically and physiologically?
2. Define lymph, chyme, and chyle.
3. What is the normal pulmonary capacity in the adult? Name the subdivisions and the capacity of each subdivision.
4. Name the four parts which constitute the circulatory system, briefly giving their functions.
5. Mention the cranial nerves of special sense, giving function of each.

PATHOLOGY.

1. Describe the pathological changes in blood in pernicious anemia.
2. In what condition do you find the tissues surrounding an indolent ulcer?
3. (a) Name the obligate bacteria. (b) Differentiate

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between the changes produced by staphylococci and tubercle bacilli.

4. What are the pathological changes produced by cirrhosis of the liver?
5. Differentiate between carcinoma and sarcoma.

GYNECOLOGY.

1. What is amenorrhea? (a) State the causes and treatment.
2. What is Alexander's operation? (a) State indication for and manner of performing it.
3. Describe prolapsus urethræ; state what it might be mistaken for and the proper treatment of it.
4. Give symptoms and treatment of acute cystitis in the female.
5. Describe briefly the uterus, ovaries, and Fallopian tubes.

PRACTICE.

1. Give symptoms and treatment in bilious colic.
2. Differential diagnosis: Typhoid and malarial fever and treatment of each.
3. Symptoms and treatment in uremia.
4. Cause and symptoms in mercurial stomatitis.
5. Differential diagnosis in rheumatic fever and gonorrheal rheumatism.

OBSTETRICS.

1. Define puerperal eclampsia and give its treatment.
2. Give causes, symptoms, and management of a case of rupture of the uterus.
3. Give average capacity of a child's stomach at birth; three months; six months, and twelve months old.
4. Symptoms and differential diagnosis of varicella.
5. Differential diagnosis between broncho- and lobar pneumonia.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

REGULAR BOARD OF MEDICAL EXAMINERS, STATE OF GEORGIA, CHEMISTRY.

1. WATER. *Chemical name*, hydrogen monoxide. *Formula*, H_2O . *Composition by weight*, sixteen of oxygen and two of hydrogen. *Composition by volume*, one of oxygen and two of hydrogen.
2. The chemical name of white arsenic is arsenic trioxide. Three preparations of arsenic used in medicine: Liquor Potassii Arsenitis, Liquor Sodii Arsenatis, Liquor Arseni et Hydrargyri Iodidi.

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Freshly prepared ferric hydroxide is the antidote for arsenic poisoning.

3.—

Chemical Name.	Pharmaceutical Name.	Formula.
Mercurous Chloride	Hydrargyrum chloridum mite	Hg_2Cl_2
Mercuric Chloride	Hydrargyrum chloridum corrosivum	HgCl_2

4. *Chemical antidotes* act as such by uniting chemically with the poison and thus converting it into a harmless or insoluble compound.

Physiological antidotes act as such by combating the physiological action of the poison.

5. *Test for indican in the urine:* The urine is mixed with one-fifth its volume of 20 per cent. solution of lead acetate and filtered. The filtrate is mixed with an equal volume of fuming hydrochloric acid containing 3:1000 of ferric chlorid, a few drops of chloroform are added, and the mixture strongly shaken one to two minutes. With normal urine the chloroform remains colorless, or almost so; but if an excess of indoxyl compounds be present the chloroform is colored blue, and the depth of the color is a rough indication of the degree of the excess.

Indicanuria is found in hypochlorhydria; in hyperchlorhydria of gastric ulcer; in conditions in which there is diminished peristalsis of the small intestines, as in ileus and peritonitis, not in simple constipation; also in conditions in which putrefactive changes occur in the body elsewhere than in the intestine, as in empyema, putrid bronchitis, gangrene of the lungs, etc. (From Witthaus' *Essentials of Chemistry*.)

SURGERY.

1. Fractures are variously classified:

- (a) Simple, compound, and complicated.
- (b) Complete (transverse, oblique, spiral, longitudinal) and incomplete (fissured, greenstick).
- (c) Single and multiple.
- (d) Comminuted, impacted, etc.
- (e) Intra- and extraarticular; intra- and extracapsular.

The cardinal principles in the treatment of fractures are: Reduction, coaptation, immobilization, and suitable measures for promoting the nutrition of the part and for preventing adhesions in the neighboring joints and muscles. Compound fractures, in addition, demand: Asepsis,

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removal of foreign matter or damaged tissues, stopping the hemorrhage, and measures to combat shock.

2. Hydrocele is diagnosed by its *translucency*. Further, it is a tumor which grows from below upward, is tense and fluctuating, is generally situated in front of the testicle, and gives no impulse on coughing.

Volkmann's and von Bergmann's operations are both recognized methods of treating hydrocele.

3. *Intussusception* is the prolapse of one part of the intestine into the part immediately below.

MATERIA MEDICA AND THERAPEUTICS.

1. The most commonly prescribed *coal tar derivatives* are: Acetanilid, phenacetin, antipyrin, phenol, cresol, salicylic acid, naphthol, guaiacol, salol, creasote, and sulphocarbolates.

Their *therapeutic uses* are: As antipyretics, as analgesics, as antiseptics, as narcotics, and as germicides; they also aid in the formation of hemoglobin.

Their *dangers* are: They are irritants, poisons; they produce collapse, shock, digestive disturbances, skin eruptions, cyanosis, chills, excessive sweating, depression of the central nervous system.

2. The *source of opium* is the exudation from the unripe capsule of the *Papaver somniferum*.

Four of its most important preparations: Morphine sulphate, tincture of opium, camphorated tincture of opium, powder of ipecac and opium.

Therapeutic uses: As an anodyne, a hemostatic, in inflammations, as an expectorant, in diarrhea, in alcoholism, manias and diabetes, as an antispasmodic, in insomnia, and as a diaphoretic.

3. Quinine is an alkaloid obtained from the bark of cinchona.

Indications: In malaria, neuralgias, hay fever, acute coryza, and as a stomachic tonic.

Contraindications: Inflammations of the middle ear, gastrointestinal tract, kidneys, or bladder; also where the patient has an idiosyncrasy.

4. *Escharotics* are agents which destroy the vitality of the tissues to which they are applied.

They may act: (1) By abstracting water from the tissues, as sulphuric acid, caustic potash. (2) By corrosive deoxidation of the tissues, as chromic acid, bromine. (3) By combining with the albumin of the tissues, as silver nitrate, zinc chloride. (4) By carbonizing the tissues, as the actual cautery and the moxa.

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5. A prescription for chronic malarial poisoning:

R. Quininæ sulphatis, ʒj.

Tincturæ ferri chloridi, ʒv.

Liquoris acidi arsenosi, ʒjss.

Syrupi zingiberis, q. s. ad ʒiv. Misce.

Signa: One teaspoonful in water after each meal.

OBSTETRICS AND DISEASES OF CHILDREN.

1. Diseases in the mother liable to injure the fetus *in utero* are: Typhoid fever, typhus fever, scarlet fever, yellow fever, malaria, cholera, smallpox, measles, pneumonia, erysipelas, syphilis, chronic poisoning by lead, mercury, or phosphorus, albuminuria, cancer.

2. The structures composing the fully developed umbilical cord are: Two arteries, one vein, Wharton's gelatin, and a layer of epithelium.

3. The causes of labor at full term are not definitely known. Among the theories held, or factors supposed to be involved, are the following: (1) The gradual distention of the uterus at the end of pregnancy, after it has reached the physiological limit of its growth, while the contents still continue to grow. (2) The fetus becomes a "foreign body," and as such excites uterine contractions and is extruded. (3) Fatty degeneration of the placenta and of the decidua. (4) The circulation of toxic products in the placental blood acts upon a center in the medulla and so produces labor.

PHYSIOLOGY.

1. *Mucous membranes* consist of an epithelial surface containing glands, a basement membrane, supporting connective tissue, with blood and nerve supply. They are found lining passages by which the internal parts connect with the exterior of the body.

Serous membranes consist of a single layer of endothelial cells, with no glands, upon a connective tissue membrane, with blood-vessels, nerves, and lymphatics. They form closed sacs lining visceral cavities.

3. The normal pulmonary capacity in an adult is about 225 to 250 cubic inches. It is the sum of the Tidal air (about 30 cubic inches), the Complementary air (about 100 cubic inches), and the Reserve or Supplemental air (about 100 cubic inches).

PATHOLOGY.

1. In *pernicious anemia* the blood would show: (1) A diminution in the number of red corpuscles; (2) a relative increase in the amount of hemoglobin; (3) poikilocytosis; (4) the presence of nucleated red cells; (5) varia-

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tion in the size of the red cells; (6) the leucocytes *may be* diminished.

2. The tissues surrounding an indolent ulcer are: Congested and edematous, with an overgrowth of connective tissue (the blood-vessels being compressed), the surrounding skin is apt to be pigmented, the papillæ are enlarged, and there is proliferation of the epithelial cells.

5. *Carcinoma* is apt to occur at a later age; is found in structures derived from the epiblast or hypoblast; possesses a fibrous stroma, in which are found both blood-vessels and lymphatics; metastasis is by the lymphatics.

Sarcoma is apt to occur earlier; is found in structures derived from the mesoblast; there is no stroma between the cells; the blood-vessels are in direct contact with the tumor cells; there are no lymphatics; metastasis is by the blood-vessels.

GYNECOLOGY.

1. Amenorrhea is the absence of menstruation.

It is *physiological*: Before puberty, during pregnancy and early lactation, and after the menopause. It may also be due to: Absence or imperfect development of the generative organs; also to stenosis, obstructions, or atresia of the genital tract; also to operative removal of the uterus or its appendages. Other causative factors are: Acute infectious diseases, anemia, chlorosis, obesity, drug habits, alcoholism, overstudy, lack of exercise, exposure to cold, and various emotional causes.

Treatment consists in: (1) Removing the cause, if possible; (2) general treatment by means of proper hygiene, rest, diet, bathing, attention to the bowels, exercise, etc.; (3) drugs reputed to be emmenagogues, such as iron, manganese, aloes, strychnine, apiol, oxalic acid, savine, rue, and tansy.

2. Alexander's operation is an extraperitoneal shortening of the round ligaments of the uterus.

Indications for Alexander's operation are: Retroflexion, retroversion, or prolapse of the uterus, when the appendages are healthy and the uterus is not bound down by adhesions.

3. *Prolapsus urethræ* is an eversion of the mucous membrane of the urethra through the meatus. It generally looks like a small tumor, which may become swollen, inflamed, and edematous; later on it gets excoriated. If the entire circumference of the urethra is involved, the tumor is dark and congested.

The condition may be mistaken for a caruncle or a polypus.

4. ACUTE CYSTITIS. *Symptoms*: Frequent urination,

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with tenesmus and a burning sensation in the urethra, later on pain in the bladder, hematuria, and the urine contains pus and epithelial cells. Chills, rapid pulse, fever, and headache may also be present.

Treatment includes: Rest, administration of plenty of cold water or milk, diuretics, bland and mild food, laxatives, hot sitz baths or vaginal douches, irrigation of the bladder with antiseptic solution followed by solution of nitrate of silver.

PRACTICE.

2. The following table is taken from an elaborate one by Thayer:

TYPHOID FEVER.	MALARIAL (REMITTENT) FEVER.
Blood shows no leucocytes; eosinophiles diminished or absent; serum causes agglomeration of typhoid bacilli; malarial parasites and pigment absent.	Blood shows no leucocytosis; eosinophiles not notably diminished; serum does not cause agglomeration of typhoid bacilli; malarial parasites and pigmented leucocytes present.
Fever uninfluenced by quinine.	Fever disappears under quinine.
Usually epidemic; prevailing commonly in cities.	Is an endemic disease occurring particularly in rural districts; rarely epidemic.
Anemia absent, excepting in later stages.	Anemia more or less marked early in the course.
Characteristic roseola.	No characteristic exanthem; urticaria not uncommon.
Has a fairly characteristic course.	No distinct course.
Urine high-colored; bile absent; Ehrlich's diazo-reaction present during the height of the process.	Urine high-colored; may show a trace of bile; Ehrlich's diazo-reaction rarely present.
Onset gradual and progressive.	Onset generally intermittent.
The temperature does not reach 40° C. (104° F.) before the third or fourth day.	The temperature may arrive at 40° C. (104° F.) within twenty-four hours.
The apathetic expression of the face, the dryness of the tongue, and sordes upon the teeth are well marked and progressive.	These symptoms are not very marked.
Herpes rare.	Herpes common.

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5.—

RHEUMATIC FEVER.	GONORRHEAL RHEUMATISM.
Generally attacks several joints and flits from one to another. Profuse acid sweats, fever, and rapidly developing anemia.	Generally monarticular (particularly favoring the knee). Symptoms are less severe. The disease occurs during or after a gonorrhea, and does not respond to anti-rheumatic treatment.

OBSTETRICS.

1. *Puerperal eclampsia* is an acute morbid condition, occurring during pregnancy, labor, or the puerperal state, and is characterized by tonic and clonic convulsions, which affect first the voluntary and then the involuntary muscles; there is total loss of consciousness, which tends either to coma or to sleep, and the condition may terminate in recovery or death.

The line of *treatment* as laid down by Edgar is as follows: For *preventive treatment*: (1) The amount of nitrogenous food should be diminished to a minimum; (2) the production and absorption of poisonous materials in the intestines and body tissues should be limited and their elimination should be aided by improving the action of the bowels, the kidneys, the liver, the skin, and the lungs; (3) the source of the fetal metabolic products and the peripheral irritation in the uterus should, if necessary, be removed by evacuating that organ.

The *curative treatment* includes: (1) Controlling the convulsions (by chloroform, veratrum, or chloral); (2) elimination of the poison or poisons which are presumed to cause the convulsions; (3) emptying the uterus under deep anesthesia, by some method that is rapid and that will cause as little injury to the woman as possible.

3.—

Average capacity of child's stomach:

At birth.	One and a quarter ounces.
Three months.	Four and a half ounces
Six months.	Six ounces.
Twelve months.	Nine ounces.

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5.

BRONCHO-PNEUMONIA.

Generally secondary (to bronchitis or an infectious disease.)

Generally found in very young or very old.

Gradual onset.

Fever is not so high, and is irregular.

Ends by lysis, at no particular date.

Generally both lungs affected.

Physical signs indistinct; and the evidences of consolidation are indefinite.

Sputum is rather streaked with blood.

LOBAR PNEUMONIA.

Generally a primary disease.

Age has little influence.

Sudden onset.

Fever is high and regular.

Ends by crisis between sixth and tenth day.

Generally only one lung affected.

The physical signs are distinct; and there is a large area of consolidation.

Sputum is rusty.

STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS OF IDAHO.

ANATOMY.

1. Into how many classes are the bones of the skeleton divided? Name the irregular bones.
2. Describe the internal saphenous vein from origin to termination.
3. Give name, origin, function, distribution and branches of the tenth cranial nerve.
4. Name the organs contained in the middle mediastinum.
5. Name the muscles that act during quiet inspiration.

HISTOLOGY.

1. Mention some special property possessed by each of the following chemical reagents rendering them individually useful in the examination of animal tissues: Acetic acid, potassium acetate, potassium hydrate, hydrochloric acid, osmic acid.
2. Describe fully the microscopical examination of fresh blood, and name some foreign elements that may be observed by this means.
3. Briefly describe the development of the human em-

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bryo from the segmentation of the vitellus to the third month of gestation.

4. What are ferments, toxins opsonins, aggressins? Define immunity, natural and acquired.

5. Give the histology of the mammary gland.

PHYSIOLOGY.

1-2. Name the digestive juices, the ferments contained in them, their action on food materials. Use the following table:

Digestive juices.	Ferments contained in them.	Action on food materials.
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3. (a) Describe a normal heart. (b) What causes heart sounds?

4. (a) What is blood pressure? (b) Tabulate the physiological causes of alteration in blood pressure.

May be raised by—		May be lowered by —
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5. What changes occur in the blood in its passage through (a) the liver, (b) the spleen?

6. Describe the physiology of excretion of urine.

7. What effects are produced in the system by the removal of the thyroid gland?

8. (a) Describe deglutition. (b) What muscles are brought into action in swallowing?

9. (a) What is the function of the third cranial nerve? (b) What effect would the division of this nerve produce?

10. Describe the (a) splenic circulation, (b) portal circulation.

MATERIA MEDICA AND THERAPEUTICS.

1. What is the highest authority on materia medica in the United States? On what does its authority rest? How many official preparations are considered?

2. Mention five changes made in the eighth revision of the U. S. P.

3. Mention the drug you consider the best: General anesthetic, analgesic, mydriatic, expectorant, sternutatory, antispasmodic, refrigerant, carminative, anthelmintic, sudorific.

4. Mention relative dosage by mouth, rectum, and hypodermic administration.

5. Give the therapeutics of normal saline solution.

6. What is Basham's mixture? Dover's powder? Fowler's solution? Golden Seal? Peruvian bark? Sal-ammoniac? Tartar emetic? Spirit of Mindererus? Paregoric? Sugar of lead?

MEDICAL RECORD.

7. What is sparteine? anilin? atrophine? bromine? caffeine, codeine, brucine, phenol, scopolamine? eserine?

8. Mention antidotes to opium, strychnine, aconite, silver nitrate, belladonna, carbolic acid, corrosive sublimate, iodine, phosphorus, chloroform.

9. Give preparation, dosage, physiological action, and therapeutics of colchicum.

10. Give preparation, dosage, physiological action, and therapeutics of nux vomica.

CHEMISTRY AND TOXICOLOGY.

1. What chemical elements are found in the human body?

2. What is a chemical compound? A chemical mixture? Give examples of each.

3. Hydrogen, oxygen, and nitrogen, describe each. Name some important compounds of each. How do they exist in nature?

4. Name and describe the three strong mineral acids. State how formed. Give properties and uses of each.

5. What are ptomains? toxins? proteins? nucleins?

6. Describe the symptoms of digitalis poisoning; give treatment.

7. State the differential diagnosis between poisoning by arsenic and mercury.

8. In a case of suspected homicidal poisoning what part of the cadaver should be preserved? How?

9. State the common courses of poisoning by lead. How treated?

10. Name five corrosive poisons; give treatment for each.

HYGIENE.

1. Describe sanitary measures for a dairy in an Idaho town.

2. What hygienic treatment for tuberculosis would you advise in Idaho?

3. Mention the dangers of the domestic use of "ditch water" in an irrigated country; dangers of the open well. How can a farmer secure the most wholesome water supply?

4. Mention five food poisons.

5. Give a list of five infective insects.

6. What are the three principal factors in hygienic living?

7. What climate is most favorable to a patient with tuberculosis? rheumatism? Bright's disease, chronic rhinitis and pharyngitis? chronic bronchitis? asthma? hay fever?

MEDICAL RECORD.

8-9-10. Describe the hygienic care of children under five years of age—food, clothing, bathing, play, and education.

DIAGNOSIS.

1. Give the differentiating points between smallpox and chickenpox.
2. Make a table differentiating chlorosis, progressive pernicious anemia, and leucocythemia.
3. With what may eczema be most frequently confounded? Give differential points.
4. Give the physical findings in the different stages of pneumonia.
5. Give the period of incubation of parotitis, pertussis, gonorrhea, syphilis, and measles.
6. More or less fever, dull pain in back, nausea and persistent vomiting at the beginning. Skin harsh and dry, pain from back to pudendum, urine scanty and high color, albuminous, high specific gravity with decrease of urea, contains epithelial casts and blood discs. What is the diagnosis?
7. Locate the valve areas of the heart.
8. What is Babinski's reflex? Describe Argyll-Robertson pupil. What are Koplik's spots? What is Kernig's sign?
9. Differentiate between appendicitis, gallstone colic, and renal colic.
10. Give five instances of referred pain, also locations and character of lesion producing each.

PATHOLOGY.

1. Locate the valves of the heart on the thoracic wall and describe the areas over which the murmurs may best be heard.
2. Define hernia; (a) direct; (b) indirect; (c) internal; (d) external; (e) what constitutes the lining of the hernial sac?
3. Give some causes of rupture or perforation of the esophagus.
4. What is the cause of prolapse of the rectum? At what age is it most frequent?
5. If called in a medico-legal case, where the complaint was vaccinated syphilis, how would you differentiate between the congenital and acquired lesions?
6. Give a descriptive definition of cretinism.
7. Diagnose a floating tumor in the abdomen by exclusion.
8. Define arteritis, arteriosclerosis, teratoma, opsonin, rhinoscleroma, morphology.

MEDICAL RECORD.

9. Give the pathological condition found in the different stages of croupous pneumonia.

10. Under what diseased condition would you find bacillus tuberculosis in the urine? How could you absolutely differentiate from the smegma bacillus?

THEORY AND PRACTICE.

1. Relapsing fever (*febris recurrens*). Define. Give the etiology and symptoms.

2. Variola. Define and give the etiology.

3. Diphtheria. Define and give the morbid anatomy.

4. Syphilis. Name the various ways of treating with hydrargyrum, and give the advantages and disadvantages of each.

5. Arthritis deformans. Give the etiology and treatment.

6. Diabetes insipidus. Give the etiology, symptoms, and treatment.

7. Intestinal obstruction. Name four causes.

8. Acute general peritonitis. Give the morbid anatomy.

9. Acute pleurisy. Give the physical signs and symptoms.

10. Aortic stenosis. Give the physical signs and differentiate from aortic regurgitation.

OBSTETRICS.

1. What treatment would you advise for a case of continued menstruation during pregnancy?

2. Name the source, character, relative quantity, and functions of the liquor amnii.

3. Describe the three stages of labor, and give the management of each stage.

4. (a) State the effects of anesthetics on the os uteri, abdominal muscles, perineum, and child. (b) Give the indications and contraindications for the employment of anesthetics during labor.

5. (a) Define caput succedaneum. (b) State how it is produced. (c) Where does the caput succedaneum appear in R. O. P.? in face presentations?

6. (a) What are the varieties of face presentation? (b) Give the diagnosis and treatment of each variety.

7. Give the varieties, causes, and treatment of hemorrhage in (a) the pregnant woman, (b) the parturient woman, (c) and the puerperal woman.

8. Describe your method for delivery of the after-coming head in left-sacro-anterior position.

9. Give the etiology, symptoms, and treatment of phlegmasia alba dolens.

10. What are the symptoms and treatment of puerperal insanity?

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GYNECOLOGY.

1. Menorrhagia and metrorrhagia. Define each. Give causes, both local and general, and symptoms.
2. Sterility. Name five causes.
3. Tuberculosis of the Fallopian tubes. Give pathological anatomy and diagnosis.
4. Vulvitis. Name three varieties and give the causes of two.
5. Hematoma of the vulva. Give causes and treatment.
6. Pudendal hernia. Describe fully. To what form of hernia does it correspond in the male?
7. Describe the anatomy of the uterus, ovaries, and tubes.
8. Uterine fibroids. Give pathology. Name three varieties and give treatment.
9. Acute oophoritis. Define. Give etiology, symptoms, and treatment.
10. Colpoperineorrhaphy (Hegar). What is the object of this operation? Describe the operation.

SURGERY.

1. Give in detail preparations for aseptic and antiseptic surgical operations. In all other questions omit the same in your answers.
2. Give minute directions for male catheterization, mentioning errors to be carefully avoided.
3. Give points of diagnosis, prognosis, and treatment of punctured wound of a joint, for instance, the knee joint.
4. Give treatment for acute osteomyelitis.
5. How would you treat fractured ribs?
6. Give differential diagnosis and treatment of dorsal dislocation of the thigh, and reason for each movement in reduction.
7. Describe in detail tracheotomy. Under what conditions would you employ it?
8. Give indications and counterindications for appendectomy.
9. How detect a floating kidney? Describe required operation in detail.
10. Differentiate between benign and malignant tumors, and give general classification of each.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS OF IDAHO.

ANATOMY.

1. The bones of the skeleton are divided into four

MEDICAL RECORD.

classes:—Long, short, flat, and irregular bones. The irregular bones are:—The vertebræ, sacrum, coccyx, temporal, ethmoid, sphenoid, superior maxilla, inferior maxilla, malar, palate, inferior turbinate, and hyoid.

4. The middle mediastinum contains: The pericardium, heart, ascending aorta, lower part of superior vena cava, termination of vena azygos major, bifurcation of trachea, two bronchi, pulmonary artery, right and left pulmonary veins, phrenic nerves and their accompanying arteries, and some bronchial lymphatic glands.

5. The muscles that act during quiet inspiration, are: The Diaphragm, Scalenus anticus, Scalenus medius, Scalenus posticus, External intercostals, Internal intercostals, and Levatores costarum.

HISTOLOGY.

4. *Ferments* are microorganisms which by their presence and growth cause definite chemical changes in certain substances contained in the media in which they develop.

Toxins are poisonous substances produced by bacteria or other cells.

Opsonin is that quality of a serum which makes a microorganism more susceptible to phagocytosis.

Aggressins are chemical substances elaborated by pathogenic microorganisms, which substances are capable of acting upon the cells and fluids of the infected body and so overcome its resistance to infection.

Immunity is the power of resistance of cells and tissues to the action of pathogenic bacteria. Immunity may be either natural or acquired.

Natural Immunity is this power of resistance, natural and inherited, and peculiar to certain groups of animals, but common to every individual of these groups.

Acquired Immunity is this resistance acquired: (1) by a previous attack of the disease caused by the bacteria, or (2) by the person being made artificially insusceptible. The conditions which give immunity from the pathogenic action of bacteria are:—(1) a previous attack of the disease; (2) inoculation, with small quantities of bacteria, so as to produce a mild attack of the disease; (3) vaccination; (4) the introduction of antitoxins; (5) the introduction of the toxins of the bacteria.

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1. 2.	PHYSIOLOGY.	
Digestive juices.	Ferments contained in them.	Action on food materials.
Saliva.....	Ptyalin.	Changes starches into dextrin and sugar.
Gastric Juice...	{ Pepsin.	Changes proteids into proteoses and peptones in an acid medium.
	{ A curdling ferment.	Curdles the casein of milk.
	{ Trypsin.	Changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; in an alkaline medium.
Pancreatic Juice	Amylopsin.	Converts starches into maltose.
	Steapsin.	Emulsifies and saponifies fats.
	A curdling ferment.	Curdles the casein of milk.
Intestinal Juice.	Invertin.	Converts maltose into glucose.

3. (b) The causes producing the *first* sound of the heart are not definitely ascertained; the following are supposed to be causatory factors: (1) The vibration and closure of the auriculo-ventricular valves, (2) the muscular sound produced by the contraction of the ventricles, and (3) the cardiac impulse against the chest wall.

The *second* sound is caused by the vibration due to the closure of the semilunar valves.

4. (a) Blood pressure is the pressure on the blood due to the ventricular systole, the elasticity of the walls of the arteries, and the resistance of the capillaries.

(b) Blood pressure:—

May be raised by—	May be lowered by—
1. By the heart beating more quickly.	1. By the heart beating more slowly.
2. By the heart beating more powerfully.	2. By the heart beating more feebly.
3. By contraction of the arterioles.	3. By dilatation of the arterioles.
	4. By deficient supply of blood to the left ventricle.

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5. (a) In its passage through the liver, the blood loses plasma, fat, proteids, organic matter; it gains sugar, urea, and heat; and it becomes less coagulable.

(b) In its passage through the *Spleen*, some say that the blood loses corpuscles, and others say that it gains corpuscles.

7. Removal of the thyroid gland causes mental and bodily dullness and apathy, tremors, twitchings, overgrowth of the connective tissues, and development of fat; the hairs fall out, and the patient becomes unwieldy and clumsy in both body and mind. Complete removal causes death in most animals, and it is not considered justifiable in man.

8. (b) The muscles brought into action in swallowing, are: The hyoglossi, styloglossi, palatoglossi, palatopharyngei, azygos uvulae, tensores palati, levatores palati, stylopharyngei, stylohyoids, geniohyoids, mylohyoids, thyrohyoids, digastrics, constrictors of the pharynx, and the muscles of the tongue.

9. (a) The third cranial nerve is the motor nerve to all the muscles of the orbit except the Superior oblique and the External rectus. Hence, it supplies the Rectus superior, Rectus inferior, Rectus internus, Inferior oblique, and Levator palpebrae superioris. It also (through the ciliary ganglion) supplies the sphincter muscle of the iris, and the ciliary muscle.

(b) Division of this nerve would produce: Ptosis of the upper lid, external strabismus, slight prominence of the eyeball, dilatation of the pupil, and loss of the power of accommodation.

MATERIA MEDICA AND THERAPEUTICS.

1. The highest authority on Materia Medica in the United States is the United States Pharmacopœia.

Its authority rests on the Medical Profession; it has not the force of law.

The number of official preparations considered in the United States Pharmacopœia, is 415.

2. Five changes made in the eighth revision of the U.S.P.: (1) Tincture of aconite was reduced in strength from 35 per cent. to 10 per cent. (2) Tincture of veratrum was reduced in strength from 40 per cent. to 10 per cent. (3) Catechu is replaced by Gambir. (4) The name Phenol is substituted for Carbolic Acid. (5) Sulphur ointment was reduced from 30 per cent. to 15 percent.

3. *General anesthetic*, Ether. *Analgesic*, Opium. *Mydriatic*, Homatropine. *Expectorant*, Ipecacuanha. *Sternutatory*, Tobacco. *Antisialic*, Atropine. *Refrigerant*, Cold water. *Carminative*, Cardamom. *Anthelmintic*, Santonin. *Sudorific*, Pilocarpus.

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4. As a general rule, the relative dosage by mouth, rectum, and hypodermic administration would be 1:2:½.
6.

Basham's Mixture	Liquor Ferri et Ammonii Acetatis.
Dover's Powder	Pulvis Ipecacuanhæ et Opii.
Fowler's Solution	Liquor Potassii Arsenitis.
Golden Seal	Hydrastis.
Peruvian Bark	Cinchona.
Salammoniac	Ammonii Chloridum.
Tartar Emetic	Antimonii et Potassii Tartras.
Spirit of Mindererus	Liquor Ammonii Acetatis.
Paregoric	Tinctura Opii Camphorata.
Sugar of Lead	Plumbi Acetas.

7.

Sparteine	Alkaloid of Scoparius.
Anilin	Phenyl amine; a coal tar derivative.
Atropine	Alkaloid of Belladonna.
Bromine	An element; one of the Halogens.
Caffeine	Alkaloid of Caffea Arabica.
Codeine	Alkaloid of Opium.
Brucine	Alkaloid of Strychnos nux vomica.
Phenol	Phenyl hydroxide; formerly Carbolic Acid.
Scopolamine	Alkaloid of Scopolia atropoides.
Eserine	Alkaloid of Physostigma.

8.

	ANTIDOTES.
Opium	Strychnine. Amyl nitrite.
Strychnine	Chloral or Chloroform.
Aconite	Digitalis, and Stimulants.
Silver Nitrate	Salt and water.
Belladonna	Stimulants. Pilocarpine.
Carbolic Acid	Magnesium Sulphate. Alcohol.
Corrosive Sublimate	White of egg followed by Emetic.
Iodine	Starch.
Phosphorus	Old French oil of Turpentine; Copper sulphate, potassium permanganate.
Chloroform	Artificial respiration. Amyl nitrite.

CHEMISTRY AND TOXICOLOGY.

1. The chemical elements found in the human body are: Hydrogen, oxygen, carbon, nitrogen, sulphur, phosphorus, chlorine, calcium, sodium, potassium, magnesium, lithium, iron, silicon, and fluorine.

2. A chemical compound is a substance made up of two

MEDICAL RECORD.

or more elements, chemically united, in definite proportions. Examples: water, sulphuric acid, iodoform.

A *mixture* is the product obtained by uniting into a more or less homogeneous whole two or more substances, whether elements or compounds, in any proportion, and without any chemical union. Examples: air, sugar adulterated with sand, salt in water.

3. HYDROGEN is a colorless, odorless, tasteless gas, the lightest known substance; it has a great affinity for oxygen; it supports neither combustion nor respiration; it is a necessary constituent of all acids; the gas will burn with a pale blue flame, giving little light, but an intense heat.

Some important compounds: Water, hydrogen dioxide, all acids.

Occurrence: free in volcanic gases, in fire damp, and the gases of the intestines; and in combination in water, in all acids and in many organic compounds.

OXYGEN is a colorless, odorless, tasteless gas, heavier than air, slightly soluble in water, has an intense affinity for other elements, combining with almost all of them except fluorine. It is necessary to life, and is a supporter of combustion.

Some important compounds: Water, potassium permanganate, all oxides, and all oxyacids.

Occurrence: free in the air and in combination in water, rocks, minerals, etc. It is more abundant than any other element, forming about forty per cent. of the total weight of the earth.

NITROGEN is a colorless, odorless, tasteless gas, it neither burns nor supports combustion nor respiration, it has no tendency to unite with other elements.

Some important compounds: Ammonia, nitric acid, urea, nitrogen monoxide.

Occurrence: free in the air, in combination in nitrates, ammonia, and in many organic substances.

4. The three strong mineral acids: (1) *Hydrochloric acid.* It is formed by the action of sulphuric acid upon sodium chloride:

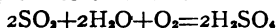


Properties. When pure this is a colorless gas with a sharp, penetrating, and irritating odor; it is very soluble in water; it does not support combustion nor does it burn in air; it is very corrosive. The ordinary hydrochloric acid is a solution of this gas in water, and is found in three varieties: the commercial, the pure, and the dilute acids.

Uses. For bleaching, disinfecting; and for manufacturing and chemical purposes.

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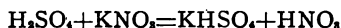
(2) *Sulphuric acid.* It is *formed* by oxidizing sulphur dioxide in the presence of water:



Properties. It is a colorless, thick, oily liquid, odorless, very corrosive; has a great tendency to unite with water; it chars organic matter.

Uses. For manufacturing and chemical purposes.

(3) *Nitric Acid.* It is *formed* by the action of sulphuric acid upon potassium nitrate:



Properties. It is a colorless or faintly yellow liquid, has a sour taste, a suffocating odor, and is very corrosive. It is a strong oxidizing agent, and stains animal tissues yellow.

Uses. For chemical purposes, and as an oxidizing agent.

5. *Ptomaines* are basic, nitrogenous compounds, produced from protein material by the bacteria which cause putrefaction.

Toxins are the poisonous products of bacteria.

Proteins are substances of unknown constitution which are indispensable to all animal and vegetable life. They are composed of carbon, hydrogen, oxygen, and nitrogen; some also contain sulphur and phosphorus.

Nucleins are the residues of the nucleo-proteids after peptic digestion. They contain phosphorus.

6. *Symptoms of Poisoning by Digitalis:* "Nausea, and occasionally vomiting. Sometimes colic and diarrhea. After two or three hours, marked diminution in the frequency of the pulse, which may fall to 40 or even 25. Dyspnea, attended by a sense of oppression in the chest and coldness of the extremities. Headache, vertigo, and tendency to sleep. Usually attacks of syncope occur, provoked sometimes by the slightest movement of the patient. Death is generally by syncope, sometimes after several hours of coma succeeded by convulsions.

Treatment: The patient must be kept strictly in the recumbent position. The stomach should be washed out with infusion of tea by the stomach tube. Stimulants should be given."—(Witthaus's *Essentials of Chemistry*.)

7.

Poisoning by Arsenic.	Poisoning by Mercury.
(1) The symptoms rarely begin within 20 minutes.	(1) The symptoms begin almost immediately.
(2) Pain is usually limited to the stomach and throat.	(2) Pain is also severe in the mouth.

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Poisoning by Arsenic.	Poisoning by Mercury.
(3) The taste is very faint, sweetish and metallic. Usually none.	(3) The taste is intensely metallic, and nauseous.
(4) The mouth and tongue are normal.	(4) The mouth and tongue are whitened.
(5) The urine contains arsenic.	(5) The urine contains mercury.

(Witthaus' *Essentials of Chemistry*.)

8. In case of suspected homicidal poisoning, the following parts of the cadaver should be preserved:—"The alimentary canal from the cardia to the middle of the rectum, *unopened*, and the contents enclosed by ligatures at the esophagus, duodenum, and lower end of gut; the liver, including the gall-bladder; one kidney; the spleen; a piece of muscular tissue from the leg; the brain, and any urine which may remain in the bladder.

"They are to be placed in *clean* and *new* glass jars, closed with glass or cork covers or stoppers. Jars with metallic caps should never be used. Tapes or cords should be tied about the jar and cap, to which they should be attached by sealing wax bearing impressions of a seal, in such a manner that access can only be had to the interior after breaking the seals or cutting the tapes or cords. Great care must be exercised that no sealing-wax can get into the jars. Each portion should be placed in a jar by itself." (Witthaus' *Essentials of Chemistry*.)

9. The most common sources of lead poisoning are the following:

"The contamination of drinking water from lead pipes. Contamination of articles of food or drugs by contact with leaden vessels, or from being enclosed in tinfoil containing an excess of lead. Drinking beer, cider, etc., which has been drawn through leaden pipes or allowed to stand in pewter vessels. The ingestion or constant handling of lead or its compounds, as the acetate, nitrate, carbonate (white lead—painter's colic), Goulard's extract, etc. The use of hair dyes containing lead."

The treatment consists in removing the cause and administering the antidote, "magnesium sulphate, which brings about the formation of the insoluble lead sulphate, while the purgative action of the magnesia is also useful. It should be preceded by an emetic, or by the use of the stomach tube." (Witthaus' *Essentials of Chemistry*.)

10. Five corrosive poisons, with treatment:

(1) Corrosive Sublimate: Give white of egg, in not too great a quantity, and follow it with an emetic.

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(2) Carbolic Acid: Give white of egg, or sodium sulphate, and gently wash out the stomach.

(3) Sulphuric Acid: Give magnesia, suspended in water, or a strong solution of soap.

(4) Potassium hydroxide (Potash): Give vinegar.

(5) Oxalic Acid: Give slaked lime suspended in a small quantity of water, follow with an emetic.

In all cases of corrosive poisoning avoid the use of stomach pump or tube.

HYGIENE.

4. Five food poisons: (1) Sausage poisoning (Allantiasis, Botulism). (2) Meat poisoning. (3) Poisonous fish. (4) Poisonous shell fish. (5) Poisonous cheese (tryotoxicon), milk, etc.

5. Five infective insects: Tsetse fly, mosquitos, flies, ticks, fleas.

6. Three principal factors in hygienic living: Pure air, pure water, and sunlight.

7. The following notes on climate are from the *Reference Handbook of the Medical Sciences*. *Tuberculosis*: The essential climatic conditions are pure air free from dust, protection from high winds, moderate dryness and equability, and a dry soil. With it must be associated the most careful, continuous, medical supervision. Assuming that the patient is in the incipient, curable stage, and that there are no other contraindicating conditions, the favorable climates are: (a) High altitudes, like Colorado, New Mexico, the Alps; (b) low altitudes, like the Adirondacks, Asheville, the Southern Pine Belt, and Southern California; (c) coast climates, represented by the Riviera resorts; (d) island climates, like Madeira and the Canaries; (e) ocean voyages.

Rheumatism: Warmth, dryness, equability, and sunshine are essential factors in the climatic treatment of rheumatism; such conditions are found in Texas, Arizona, the Southern Pine Belt, some portions of southern California, the inland Florida resorts, the desert of Egypt, and Algeria. The hydrotherapeutic treatment of this disease as exhibited at such resorts as Richfield Springs, the Virginia Hot Springs, the Arkansas Hot Springs, Aix-les-Bains, and others, is most efficacious.

Bright's Disease: A warm, equable, windless climate, such as is found in many low inland or coast resorts, examples of which are Arizona, Madeira, the Southern Pine Belt, Florida, Southern California, etc. The West Indies are highly extolled by Burney Yeo.

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Chronic Bronchitis: When expectoration is abundant, a dry, warm, inland climate like Thomasville, Augusta, Summerville, and Camden, S. C., southern California, in the winter; and the seaside or mountains in the summer. If the expectoration is scanty, a warm moist climate like Florida, Nassau, Algiers, Madeira, in winter; and Newport, the Jersey Coast, Nantucket, Cape Cod, etc., in the summer.

Asthma: The high-altitude resorts appear to give the best results, especially when the neurotic element seems to be the prominent factor in the case. If the bronchitis seems to be the most important element, either a sedative or a stimulant climate is to be selected according to the character of the bronchitis. Or if the exciting cause appears to be the most important, especial consideration must be given to that in the selection of a resort.

Hay Fever (Nasal Asthma): The Adirondacks, White, Catskill, and Alleghany Mountains, Mackinac Island, Georgian Bay, Cape Breton, the "North Woods," Beach Haven, Fire Island, and Halifax, Nova Scotia, are some of the many resorts which afford more or less immunity. An ocean voyage and traveling in Europe are also prophylactic.

DIAGNOSIS.

1. Differentiation between smallpox and chickenpox: (1) Very young children are attacked with varicella, whereas variola usually shows itself in adults. (2) Vaccinated children readily take varicella; not so variola, even in the modified form. (3) Children who have had varicella may contract variola, even soon afterwards; or the two diseases may coexist. (4) Varicella is noninoculable, whereas variola is notoriously so. (5) The eruption of varicella appears in twenty-four hours; that of variola not till the third day. (6) The febrile symptoms continue after the eruption appears in varicella; those of variola subside. (7) In varicella the spots come out in successive crops; this is never seen in variola. (8) The spots in varicella are unilocular, and collapse on being punctured; the spots in variola are multilocular, and do not collapse on being punctured. (9) In varicella the eruption is very irregular, and appears over the body generally; in variola it appears in groups of threes and fives, and is always seen on the limbs. (10) The papule in varicella is soft, and disappears on stretching the skin; in variola it is hard and shotty, and does not disappear on stretching the skin. (From J. W. Moore's work on *Variola and Varicella*.)

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2. The following table is compiled from one in Butler's *Diagnostics of Internal Medicine*:

CHLOROSIS	PROGRESSIVE PERNICIOUS ANEMIA	LEUCOCYTHEMIA	
		Spleno- Myelogenous	Lymphatic
<i>Red cells</i> average 4,000,000; rarely under 2,000,000. Poikilocytosis. Many microcytes. Occasional normoblasts.	<i>Red cells</i> average 1,000,000. Microcytes, megakaryocytes. Normoblasts moderately numerous. Megakaryoblasts present, often exceed normoblasts.	<i>Red cells</i> , about 3,000,000; rarely under 2,000,000. Numerous normoblasts. Megakaryoblasts moderately numerous. Some giantoblasts.	<i>Red cells</i> about 3,000,000 or somewhat less. Normoblasts and megakaryoblasts comparatively rare.
<i>Hemoglobin</i> always relatively low.	<i>Hemoglobin</i> often relatively high.	<i>Hemoglobin</i> normal or relatively decreased.	<i>Hemoglobin</i> diminished.
<i>White cells</i> normal or slightly increased.	<i>White cells</i> usually decreased.	<i>White cells</i> average 450,000. Maybe 1:10, 1:5 or 1:1 red.	<i>White cells</i> average 100,000 or less.
<i>Lymphocytes</i> increased.	<i>Lymphocytes</i> increased.	<i>Lymphocytes</i> 7.5%.	<i>Lymphocytes</i> 90%.
<i>Polynuclears</i> decreased.	<i>Polynuclears</i> decreased.	<i>Polynuclears</i> 49%.	<i>Polynuclears</i> 3%.
<i>Eosinophiles</i> normal.	<i>Eosinophiles</i> normal.	<i>Eosinophiles</i> 4.5%.	<i>Eosinophiles</i> 0.7%.
<i>Myelocytes</i> rare.	<i>Myelocytes</i> common; usually eosinophilic.	<i>Myelocytes</i> 35%.	<i>Myelocytes</i> 0.3%.

6. Acute nephritis.

7. See below, **PATHOLOGY**, Question 1.

8. *Babinski's reflex*: When the sole of the foot is tickled, the toes extend instead of flex.

Argyll-Robertson pupil is the condition of the pupil in which it responds to accommodation, but not to light.

Koplik's spots: Small red spots with a bluish-white center, found on the inner surface of the cheeks in measles; it is evident before the eruption appears on the skin.

Kernig's sign: With the patient in the dorsal position, and the thigh flexed at right angles to the pelvis, there is inability to straighten the leg completely. The condition is found in meningitis.

10. *Five instances of referred pain*: (1) Pain on the inner surface of the knee in hip joint disease. (2) Pain in the mammary gland in uterine disease. (3) Pain over the region of the stomach in caries of the spine. (4) Pain in the penis or testicle in stone in the kidney. (5) Pain under the right scapula in hepatic disorders.

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PATHOLOGY.

1. *Location of the valves of the heart on the thoracic wall:* "The *right auriculo-ventricular valves* are situated behind the sternum above the level of the fourth costal cartilage; the *left auriculo-ventricular valves* are opposite the third intercostal space, about one inch to the left of the sternum; the cusps of these valves extend as low as the fifth costal cartilage. The *pulmonary valves* lie immediately behind the junction of the third left costal cartilage with the sternum; the *aortic valves* are behind the upper border of the third intercostal space just at the left side of the sternum." (Holden.)

The *mitral* murmurs may be best heard at the apex of the heart, in the left fifth intercostal space, near the nipple. The *aortic murmurs* may be best heard in the second right intercostal space, near the sternum. The *pulmonary* murmurs may be best heard in the second left intercostal space, near the sternum. The *tricuspid* murmurs may be best heard on the left border of the sternum near the ensiform cartilage.

2. *Hernia* is the protrusion of a viscus from its normal situation through an opening in one or more of the layers forming the wall of the cavity within which it is contained.

(a) A *direct* (inguinal) hernia, is one passing directly through the external abdominal ring without having passed through the inguinal canal.

(b) An *indirect* (inguinal) hernia is one that passes through the inguinal canal before appearing at the external abdominal ring.

(c) An *internal* hernia is the protrusion of a viscus through an aperture in the interior of the body.

(d) An *external* hernia is one that protrudes through an opening in the wall of a cavity.

(e) The hernial sac is lined with peritoneum.

3. *Causes of rupture or perforation of the esophagus:* Excessive vomiting or retching, particularly after the ingestion of large quantities of food or drink; carcinoma; abscess; aneurysm; foreign bodies.

4. *Cause of prolapse of the rectum:* Relaxation of the tissues due to excessive straining, and debility. It is most frequent in childhood.

5. A hoarse cry, coryza, labial fissures, protruding forehead, "sniffles," and the "syphilitic facies" would all indicate the congenital rather than the acquired variety of syphilis.

6. "Cretinism is a condition characterized by an arrest of mental and physical growth, and associated with hypo-

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plasia or absence of the thyroid. It usually arises in the early years of life, but is occasionally congenital. The cretin is stunted, the lips thick, the skin dry and rough, the abdomen large, and the genitals remain infantile, and the mental state is that of an imbecile." (Hewlett's *Pathology*.)

8. *Arteritis* is inflammation of one or more coats of an artery.

Arteriosclerosis is a degenerative process of the intima of an artery.

Teratoma is a congenital tumor containing fetal remains; it is supposed to be due to an abortive fetus being included in another fetus, which latter develops normally.

Opsonin is that quality of a serum which makes a microorganism more susceptible to phagocytosis.

Rhinoscleroma is an indurated new growth of the skin and mucous membrane of the nose.

Morphology is that branch of science which treats of the form and structure of organized beings, and of variations in such form and structure.

10. Tubercle bacilli are found in the urine in tuberculous diseases of the urinary tract.

To differentiate the tubercle bacillus from the smegma bacillus: After treating the film with the dilute mineral acid, dip it in absolute alcohol for one or two minutes; the smegma bacillus will be decolorized, whereas the tubercle bacillus will not be decolorized.

THEORY AND PRACTICE.

4. The various ways of treating syphilis with hydrargyrum, and their advantages and disadvantages, are:

Method.	Advantages.	Disadvantages.
By mouth.	Simple, easy, dosage easily regulated.	May upset digestion.
Fumigation.	Rapid effect. Psychic effect.	Troublesome, special devices or apparatus required.
Inunction.	Efficient. Does not disturb digestion. Useful, to give stomach a temporary rest.	Uncleanly.
Hypodermic injection.	Effective, rapid, does not disturb digestion.	Painful. Abscess formation. Requires attendance of physician for every dose.
Intravenous injection.		Dangerous.

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OBSTETRICS.

1. Rest in bed is the only treatment required for continued menstruation during pregnancy; but the condition is rare, and one should suspect ectopic gestation, placenta prævia, or abortion.

2. The liquor amnii is the fluid contained in the amniotic sac; it is alkaline in reaction, has a specific gravity of about 1.001 to 1.008, its quantity is variable, but is generally about two pints. It consists chiefly of water, but contains small amounts of albumin, epithelial cells, urea, phosphates, chlorides, etc. Its source is unsettled.

Functions: (a) *During Pregnancy:* (1) As a protection to the fetus against pressure and shocks from without. (2) As a protection to the uterus from excessive fetal movements. (3) It distends the uterus, and thus allows for the growth and movements of the fetus. (4) It receives the excretions of the fetus. (5) It surrounds the fetus with a medium of equable temperature, and serves to prevent loss of heat. (6) It prevents the formation of adhesions between the fetus and the walls of the amniotic sac. (7) It has been supposed, by some, to afford some slight nutrition to the fetus.

(b) *During Labor:* It acts as a fluid wedge, and dilates the os uteri and the cervix; it also slightly lubricates the parts.

7. The following (from Gould and Pyle's *Cyclopedia of Medicine and Surgery*) is a useful classification of the hemorrhages in question:

A. *Hemorrhages of Pregnancy:* Caused by (1) placenta prævia; (2) premature separation of a normally situated placenta; (3) appoplexy of the decidua or placenta.

B. *Hemorrhages of Labor:* Caused by (1) placenta prævia; (2) premature separation of a normally situated placenta; (3) relaxation of the uterus; (4) laceration of the cervix; (5) rupture or inversion of the uterus.

C. *Hemorrhages of the Puerperium:* Caused by (1) retained secundines; (2) displaced uterus; (3) displaced thrombi; (4) fibroid tumors; (5) hypertrophied decidua; (6) carcinoma.

GYNECOLOGY.

1. *Menorrhagia* is an excessive loss of blood at the menstrual periods.

Metrorrhagia is a hemorrhage from the uterus at other than the menstrual periods.

Local causes: Uterine displacements, malignant disease, inflammations of uterus or appendages, fibroids, cystic degeneration of the cervix, subinvolution, ectopic gestation, abdominal tumors.

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General causes: Hemophilia, scurvy, purpura, malaria, anemia, mitral disease, diseases of kidneys, or liver, acute infectious fevers.

Symptoms: The hemorrhage at or between the menstrual periods is the characteristic symptom.

2. *Five causes of sterility:* (1) Absence or lack of development of any part of the genital tract; (2) gonorrhea; (3) pronounced flexions of the uterus; (4) salpingitis; (5) great obesity.

STATE BOARD EXAMINATION QUESTIONS.

ILLINOIS STATE BOARD OF HEALTH.

PHYSIOLOGY.

1. Give the functions of the pneumogastric (tenth cranial) nerve.
2. Discuss blood pressure.
3. Discuss color vision.
4. Discuss the function of the kidneys.
5. Name the digestive principle or principles of the following secretions and the class or classes of foods each acts upon: Saliva, gastric juice, bile, pancreatic juice.
6. Describe metabolism.
7. What are the functions of the liver?

NEUROLOGY.

1. Briefly describe the organ of hearing.
2. Describe reflex action.
3. What are the functions of the cerebrum and of the cerebellum?

ANATOMY.

1. Give the exact location of the macula lutea or yellow spot of Sommering, in the eye.
2. Into what parts is the brain divided and of what are the convolutions of the cerebrum composed?
3. What bone commences to ossify before any other bone in the body?
4. Into what parts is the sternum divided, and how many pairs of muscles are attached to the sternum?
5. Give origin, insertion, nerve supply, and action of the subscapular muscle.
6. How are the pulmonary veins formed? Where do they terminate? What blood do they carry? Do they have valves?
7. How is the circulation carried on after the application of a ligature to the brachial artery in the upper third of the arm?

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8. Name the ductless glands.
9. Name the ligaments of the hip joint.
10. What separates the tonsil from the internal carotid artery?

PRACTICE OF MEDICINE.

1. Describe the symptoms and give cause, treatment, and prognosis of Addison's disease (disease of suprarenal capsule).
2. Give the cause, diagnosis, symptoms of purulent inflammation of the bile passages (suppurative cholangitis).
3. Etiology, symptoms, signs, and treatment of a large pleural effusion.
4. What are the chief dangers and common complications of diabetes mellitus?
5. Causes, diagnosis, duration, and treatment of peripheral neuritis.
6. To what class of diseases does chorea belong? Give treatment and name any important complication.
7. Give the treatment of mucous colitis.
8. Give the prognosis and treatment in cases of aortic regurgitation with general arteriosclerosis.
9. Give treatment and prognosis in chronic contracting nephritis (interstitial).
10. Give treatment of acute endocarditis.

GYNECOLOGY.

1. State upon what grounds you would base your preference for an abdominal or a vaginal hysterectomy.
2. Describe the operation of trachelorrhaphy.
3. What do you understand by the so-called cervical erosions?
4. Stenosis of the cervix; give the etiology, symptoms, and treatment.
5. What do you understand by vicarious menstruation?
6. Describe the pathological changes in chronic ovaritis.

LARYNGOLOGY AND RHINOLOGY.

1. Give the pathology of croupous laryngitis.
2. Give the appearance, symptoms, and treatment of follicular tonsillitis.

MEDICAL JURISPRUDENCE.

1. Differentiate between cerebral apoplexy and acute alcoholism.
2. What is paranoia?

PHYSICAL DIAGNOSIS.

1. Give symptoms and prognosis of lymphadenoma.

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2. Give etiology, symptoms, and prognosis of pneumothorax.
3. Give differential diagnosis between organic hemiplegia and hysteric hemiplegia.
4. Give symptoms of acute synovitis of knee joint.
5. Give differential diagnosis between squamous eczema, psoriasis, and seborrhea.

OPHTHALMOLOGY AND OTOTOLOGY.

1. Give complications of middle ear disease.
2. Give treatment of chronic purulent otitis media.
3. Give symptoms and treatment of iritis.

PEDIATRICS.

1. How would you treat abdominal pain in infants?
2. Give the prognosis of the following diseases in infants (taking the age factor alone in consideration), lobar pneumonia, bronchial pneumonia, and whooping cough.

OBSTETRICS.

1. Define abortion, mention the dangers, and give treatment following abortion.
2. Give symptoms of placenta prævia. What is the immediate danger of this condition?
3. What are the causes of puerperal albuminuria? What is the treatment?
4. What are the most serious complications met with in breech presentation?
5. What are the causes of nausea and vomiting in pregnancy? What is the treatment?
6. In case of hemorrhage in the third stage of labor, what is the necessary treatment?
7. What is phlegmasia alba dolens? At what time does it usually occur? What is the treatment?
8. Describe the uterus, its normal position, its relationship to other organs, and means by which it is held in place.
9. What are the diagnostic symptoms of pregnancy before the fourth month? After the fifth month?
10. What would you do in case of rupture of the uterus in the first stage of labor? In the second stage?

SURGERY.

1. Give the indications for operation in compound fracture of the thigh, and describe the operation in detail.
2. State the symptoms of fracture of the surgical neck of the humerus, and detail an approved treatment.
3. Give the early symptoms and treatment of hip-joint disease.

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4. Describe the symptoms of cerebral compression and concussion, and detail the treatment for each.
5. Enumerate conditions in which you would administer ether in preference to chloroform.
6. Give early symptoms of caries of the vertebra. (Pott's disease).
7. Diagnose pyonephrosis.
8. Give treatment for retention of urine in male patient after catheterization has failed.
9. Differentiate between appendicitis (catarrhal), salpingitis, and ovaritis.
10. Name the clinical varieties of abdominal hernia.

MATERIA MEDICA AND THERAPEUTICS.

1. Name the chief classes of diuretics, and give indications for use.
2. Under what circumstances would you employ the following and why? Give dose of (a) strychnine (sulphate), (b) calomel, (c) asparagin, (d) aconite (tincture.)
3. Name several substances which *lower* blood pressure and give indications for their employment.
4. Name several substances which *raise* blood pressure and state when you would use them.
5. Give dose and action and therapeutic indications for the following: Atropine, pilocarpine.
6. Give therapeutic classification and dose of the following: (a) Potassium bromide, (b) male fern, (c) arsenious acid, and (d) gentian (co. tincture).
7. Describe the physiological action of one of the preparations of calcium used in medicine.
8. Describe the general indications for the use of liniments and name some of the drugs so employed.
9. Describe the different methods of employing mercury in syphilis.
10. Dose and use of physostigma.

PATHOLOGY.

1. Describe the process of fatty degeneration.
2. Define the terms "malignant" and "benign." What features of an abnormal growth render it abnormal?
3. Give the pathology and varieties of goiter.
4. Describe the formation of pus. What are some of the phenomena attending pus formation?
5. What are the pathological changes in emphysema of the lungs?

BACTERIOLOGY.

1. Describe the gonococcus and give the pathological changes due to gonococcic infection.

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2. Describe an approved method of obtaining cultures of the diphtheretic bacillus.
3. What pathological conditions may be produced by the colon bacillus?
4. Describe toxins, antitoxins, and ptomaines.
5. Define immunity. What do you understand by acquired immunity.

CHEMISTRY.

1. What is valency?
2. What characteristic reaction would ozone or hydrogen dioxide have on potassium iodide?
3. Complete this formula: $\text{Na}_2\text{SO}_4 + 2\text{C} + \text{CaCO}_3 =$
4. What is formed by treating hydrochloric acid with manganese dioxide?
5. Complete this formula: $\text{K}_2\text{O}_8 + 2\text{C} =$

ETIOLOGY AND HYGIENE.

1. What is the etiology of lobar pneumonia?
2. What do you believe to be the most frequent cause of excessive secretion of HCl in the stomach?
3. What is the etiology of progressive muscular atrophy?
4. How should an epidemic of bubonic plague be managed in order to prevent the spread of the disease?
5. What measures would you recommend as the most efficient way of preventing malaria?

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

ILLINOIS STATE BOARD OF HEALTH.

PHYSIOLOGY.

1. *Functions of the pneumogastric nerve:* "Throughout its whole course the vagus contains both sensory and motor fibers. To summarize the many functions of this nerve . . . it may be said that it supplies (1) *motor* influence to the pharynx and esophagus, stomach, and intestines, to the larynx, trachea, bronchi, and lungs; (2) *sensory* and, in part, (3) *vasomotor* influence, to the same regions; (4) *inhibitory* influence to the heart; (5) *inhibitory* afferent impulses to the *vasomotor center*; (6)

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excito-secretory to the salivary glands; (7) *excito-motor* in coughing, vomiting, etc." (Kirkes' *Physiology*.)

2. Blood pressure is the pressure on the blood due to the ventricular systole, the elasticity of the walls of the arteries, and the resistance of the capillaries.

Various conditions may contribute to cause alteration in the blood pressure; thus if the heart beats more quickly, or more vigorously, the blood pressure is raised; a similar condition occurs from the contraction of the arterioles. The reverse of each of these conditions lowers the blood pressure.

3. There are two theories of color vision, as follows:

"(a) The *Young-Helmholtz theory*, which assumes that there are three fundamental sensory elements in the retina which correspond to and are stimulated primarily by the primary colors—red, green, and violet; also that each color-perceiving element is slightly stimulated by others of the spectral rays. When red rays fall upon the retina they stimulate the red-perceiving elements strongly and the green and violet very feebly. The resulting sensation is that of red. So also is it with green and violet rays. When the retina is stimulated by both red and green rays the two corresponding color-perceiving elements are strongly stimulated. The resulting color perception, however, is a combination of the two sensations and corresponds to some region of the spectrum between the red and green, according to the relative intensity of the two stimuli. When all three color-perceiving elements are stimulated at the same time this theory assumes that white light will be perceived. In a similar manner all the various color sensations are arrived at.

(b) *Hering's theory*, which is based on the assumption that there are chemical substances in the retina, photogenic substances, which are stimulated by the colors of the spectrum. It assumes three photogenic substances which are called the red-green, the yellow-blue, and the white-black substances. By this theory, when the red-green substance is stimulated by red or green light, respectively, the former produces destructive or catabolic changes, the latter constructive or anabolic changes, in the substance. When red light falls upon the retina it produces catabolism in the red-green substance, which in turn develops a nerve impulse that arouses the sensation of red. When green light, on the other hand, stimulates the retina, it produces anabolism of the red-green substance and the sensation of green. The same rule holds with the other two substances. It will be noticed that this

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theory is based on the complementary colors." (From Kirkes' *Physiology*.)

5.—

SECRECTIONS.	DIGESTIVE PRINCIPLES.	FUNCTION.
Saliva.....	Ptyalin.	Changes starches into dextrin and sugar.
Gastric juice...	Pepsin.	Changes proteids into proteoses and peptones in an acid medium.
	A curdling ferment.	Curdles the casein of milk.
	Trypsin.	Changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; in an alkaline medium.
Pancreatic juice	Amylopsin.	Converts starches into maltose.
	Steapsin.	Emulsifies and saponifies fats.
	A curdling ferment.	Curdles the casein of milk.

Bile contains an amylolytic ferment which has a slight action on starch; it also aids in the digestion, emulsification and absorption of fats.

6. Metabolism is a name given to the entire series of changes that occur in a cell or organism during the processes of nutrition. It is of two kinds: (1) Anabolic, or constructive, and (2) catabolic, or destructive.

7. The *functions of the liver* are: (1) The secretion of bile, (2) the formation of glycogen, (3) the formation of urea and uric acid, (4) the manufacture of heat, and (5) the conversion of poisonous and harmful into inert material.

ANATOMY.

1. The macula lutea is situated on the inner surface of the retina, at the posterior pole of the eyeball, right in the center, and hence directly in the axis of the globe.

3. The clavicle commences to ossify before any other bone.

4. The sternum is divided into: (1) The manubrium, (2) the gladiolus, and (3) the ensiform or xiphoid appendix.

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Nine pairs of muscles and one single muscle are attached to the sternum.

7. If the ligature is applied *above* the origin of the Superior Profunda: The Posterior Circumflex and the Subscapular, by anastomosing with the ascending branches of the Profunda, carry on the circulation.

If the ligature is applied *below* the origin of the Superior Profunda: The Superior Profunda and its branches anastomose with the recurrent branches of the Radial, Ulnar, and Interosseous, and thus carry on the circulation.

10. The tonsil is separated from the internal carotid artery by the Superior Constrictor of the Pharynx.

GYNECOLOGY.

1. As to preference between vaginal and abdominal hysterectomy, the following is taken from Garrigues' *Gynecology*: "If the vaginal route is available, it should be preferred, because it entails much less shock, requires a simple after-treatment, does not leave any visible cicatrix, predisposes less to hernia, and allows the patient to resume work in shorter time. On the other hand, the vaginal route is more difficult on account of the limited space. Hemorrhage is more troublesome to check, adhesions are harder to separate, and the bladder and intestine more exposed to injury and less accessible for repair. The pelvic cavity cannot be seen so well and the abdominal not at all. If tissue is left to mortify, it emits an offensive odor."

5. "*Vicarious menstruation*: This is a flow of blood from some other organ recurring at the monthly periods and taking the place of menstruation. It may occur from the hemorrhoidal vessels, the lungs, the skin, the nails, the mammary glands, ulcerated surfaces, and many other parts." (King's *Manual of Obstetrics*.)

MEDICAL JURISPRUDENCE.

1. In *cerebral apoplexy*: There is generally paralysis of the head and upper limbs; and in left-sided lesions there may be aphasia; the pulse is slow and full; the respirations are at first slow, regular, and stertorous, later on becoming of the Cheyne-Stokes type.

In *acute alcoholism*: The patient can generally be aroused; the coma is not, as a rule, complete; the face may be flushed; the pupils are normal or dilated; the respirations are normal in frequency, but deep; the skin is cool and moist, and the body temperature may be below normal.

2. *Paranoia* is a primary chronic form of insanity, occurring especially in degenerates, and marked by hallucinations and delusions which are systematized, i.e. exhibit a

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logical connection and sequence, so that the patient from his perverted ideas, in which he firmly believes, draws logical and coherent influences. (From Duane's *Medical Dictionary*.)

OBSTETRICS.

2. The *symptoms* of placenta prævia are: Sudden hemorrhage, accompanied by syncope, vertigo, restlessness, and feeble pulse.

The *immediate danger* is death of the mother from hemorrhage.

4. The most serious complications met with in breech presentation are: Extension of the head or of the arms over the head; compression of the umbilical cord; premature respiration or asphyxiation of the child; the child may also suffer from paralysis, hemorrhage, fracture, or dislocation.

6. "In the presence of actual hemorrhage the treatment varies according as the placenta is still within the uterus or has already been expelled. In the former case the uterus should at once be grasped through the abdominal wall and firmly kneaded. If firm contractions come on, all is well, but if the hemorrhage continues and the uterus relaxes as soon as the kneading is stopped, the placenta should be expressed by Credé's method; and if this cannot be accomplished and the patient's condition is alarming, manual removal may become necessary. . . . If the hemorrhage does not cease after the delivery of the placenta, the cause should be ascertained and suitable treatment instituted. Tears should be located and their edges brought together by sutures. On the other hand, if the hemorrhage is the result of the retention of placental tissue, the carefully disinfected hand should be carried up into the uterus in order to seek for and remove the retained cotyledon. Under such circumstances the hand acts as a most efficient irritator, causing the uterus to contract energetically. After separating the retained portion of the placenta the hand should not be withdrawn at once, but should be allowed to recede gradually as it is forced down by the contraction of the fundus. If the hemorrhage is due to atony, the uterus should be vigorously kneaded, and from forty to sixty minims of ergot or of ergotol administered hypodermically. . . . If these measures are not attended with the desired result, a very hot intrauterine douche of several liters of sterile salt solution should be employed. . . . If the hemorrhage persists in spite of the douche, our only hope of controlling it is by packing the uterus tightly with sterile gauze. Before resorting

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to the use of the pack it is always advisable to palpate the interior of the uterus, as occasionally a portion of the placenta may have been retained, even though immediately after expulsion the organ may have apparently been entire." (Williams' *Obstetrics*.)

SURGERY.

3. *The early symptoms of hip-joint disease* are: Night cries (in a child); lameness in the morning; a slight limp; tendency to become tired on slight exertion; wasting; spasm; pain; swelling; and deformity (either real or apparent).

Treatment: In the early stages, rest in bed is indicated, with extension; also tonics, restoratives, fresh air. If necessary, the limb should be straightened and put up in plaster-of-Paris, or a brace or other mechanical appliance should be used. Intraarticular injections of iodoform have been recommended. Resection of the hip may be necessary.

4.—

CONCUSSION OF THE BRAIN.

Unconsciousness is incomplete; patient can be made to answer, though it may be briefly, and in simple words.

Special senses, though greatly blunted, are not abolished.

Power of movement not destroyed; if the position of a limb be changed the patient will resist or bring it immediately into the original position.

Respiration is quiet and feeble.

Pulse feeble, frequent, and intermittent.

The stomach sickens and rejects its contents.

The feces may be discharged incontinently, as may also the urine, though not usually.

COMPRESSION OF THE BRAIN.

Complete unconsciousness; may scream into patient's ear at the top of the voice, but will receive no answer.

Special senses entirely suspended.

Complete or partial paralysis; in most cases hemiplegia.

Respiration full and noisy.

Pulse full and slow, and sometimes laboring.

The stomach is insensible to any impression; no nausea or vomiting.

Bowels are torpid, and the bladder incapable of emptying itself, though the urine may escape by overflow.

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CONCUSSION OF THE BRAIN.

Deglutition little impaired.

Pupils variable, though generally contracted; the eyelids somewhat open.

Temperature of the body less than natural.

COMPRESSION OF THE BRAIN.

Deglutition difficult or impossible.

Pupils variable, though generally much dilated, and the eyelids closed.

Temperature almost natural, a little below the normal standard.

(From Treves' *Manual of Surgery*.)

5. "*Chloroform* is not to be used in cases of fatty heart or dilatation of the heart, in those with a known idiosyncrasy, nor in the so-called lymphatic persons with overgrowth of lymphoid tissues, as, for example, adenoids. In the latter case it is particularly apt to cause sudden death. In valvular disease of the heart chloroform may be used with caution, although ether is preferable. Given a case of valvular disease that must be subjected to operation, the chances are bettered with an anesthetic than without it, as the pain and mental shock are worse for the heart than is the anesthetic." (Hare's *Practical Therapeutics*.)

6. The early symptoms of caries of the vertebra are: Pain in the back, which is made worse by movement or pressure; muscular spasm; chronic bilateral belly-ache; the patient easily tires, keeps the back rigid, and constantly rests; torticollis may be present; and the patient may support the head with his hands.

7. *Pyonephrosis* may be diagnosed by: The presence of pus in the urine, which may be constant or intermittent; some obstruction to the flow of urine; sepsis; a tumor in the loins; the use of the cystoscope and ureteral catheter will aid in the diagnosis.

8. The bladder should be punctured above the pubes.

9. In *appendicitis* the pain is of sudden onset and is localized in the right iliac fossa; there is abdominal rigidity, chiefly of the right rectus muscle; there are usually fever, nausea, vomiting, and constipation.

Salpingitis is diagnosed by: A dragging sensation in the neighborhood of the affected tube; colicky pain, which is increased on exertion or even on standing; abdominal tenderness; menstrual disorders, as amenorrhea, metrorrhagia, dysmenorrhea, menorrhagia; dyspareunia; there may be septic symptoms and peritonitis; sterility generally ensues. On examination there will be found a fullness in Douglas' pouch and one or both lateral fornices; in these

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latter will be felt either the tubes, distorted and possibly adherent, or a sausage-shaped tumor, which is very painful; the uterus is retroverted or retroflexed, and may be bound down by adhesions; there may be an intermittent expulsion of pus accompanied and preceded by a burning pelvic pain.

The most common cause is infection, either gonorrheal or puerperal.

In *ovaritis* the pain is not localized, but spreads to the vagina and rectum; it is usually worse just before the menstrual period, which sometimes affords relief; on vaginal examination the ovary is found to be tender.

10. The clinical varieties of abdominal hernia are: Reducible, irreducible, obstructed or incarcerated, inflamed, and strangulated.

MATERIA MEDICA AND THERAPEUTICS.

1. Diuretics are classified as: (1) Hydragogue diuretics, (2) stimulant diuretics, and (3) refrigerant diuretics.

Diuretics are employed: (1) To remove excess of fluid from the tissues, as in dropsy; (2) to dilute the urine; (3) to promote the elimination of waste products or poisonous material from the blood, and (4) to maintain the action of the kidneys.

3. Substances which *lower* blood pressure: Opium, aconite, antimony, dilute hydrocyanic acid, ipecac, chloral, chloroform, veratrum, potassium.

4. Substances which *raise* blood pressure: Alcohol, digitalis, ether, strychnine, ammonia, strophanthus, camphor, squill.

5. ATROPINE: *Dose*, gr. 1/160.

Action: Anodyne, mydriatic, inhibits secretions, depressant of terminations of nerves, accelerates the heart beat, causes rise in blood pressure, but toxic doses cause the blood pressure to fall, stimulates the respiratory center, but large doses depress the same; it may cause vertigo, restlessness, excitement, delirium, or mania.

Therapeutic Indications: For the relief of pain, to dilate the pupil, to check secretions, for diarrhea, for asthma, for shock and collapse, for colic of all kinds, for delirium, for epilepsy, chorea and migraine, for paralysis, for cough, in constipation, in chorea, spermatorrhea, or cystitis.

PILOCARPINE: *Dose*, gr. 1/5.

Action: Stimulant of secretory nerves and of involuntary muscles, myotic, nervous depressant, sudorific.

MEDICAL RECORD.

Therapeutic Indications: In Bright's disease, uremia, and whenever a prompt diaphoresis is required.

6.—

	Therapeutic Classification.	Dose.
(a) Potassium bromide.	Nervous depressant.	gr. xv.
(b) Male fern.	Anthelmintic.	gr. lx.
(c) Arsenious acid.	Tonic or restorative.	gr. 1/30
(d) Gentian (co. tincture.)	Stomachic.	ʒj.

9. Mercury is employed in syphilis in the following ways: (1) inunction, (2) by mouth, (3) hypodermically, (4) fumigation.

10. *PHYSOSTIGMA: Dose, gr. jss.*

Use: "Atony the bladder and intestines; gastric and intestinal dilatation; flatulence; chronic respiratory affections; tetanus; trismus neonatorum and other spasms; epilepsy; chorea; as an antidote in strychnine poisoning. Physostigmine is used locally in ophthalmic practice." (Wilcox, *Materia Medica*.)

8. *Liniments* are used for the relief of local pain, for superficial neuralgias, as stimulants and rubefacients, to abort beginning inflammations, for rheumatism, bruises, sprains, for some local skin affections.

Some of the drugs so employed are: Aconite, ammonia, alcohol, camphor, belladonna, lime, linseed oil, cotton seed oil, chloroform, mercury, opium, soap, turpentine.

BACTERIOLOGY.

3. "The *bacillus coli communis* is associated with many diseases especially of the abdominal organs, though it is not positively known what etiological relation, if any, it bears to these affections. It has been found in peritonitis, appendicitis, cystitis, urethritis, pyelonephritis, etc. The colon bacillus has been assumed to be the cause of cholera nostras and cholera infantum. . . . Puerperal fever is not infrequently due, in part at least, to infection of the vagina or uterus by the colon bacillus. Other diseases to which this organism seems to stand occasionally in relation are endocarditis, meningitis, tropical abscess of the liver, bronchopneumonia, fetid bronchitis, amygdalitis, etc. In these diseases the *Bacillus coli communis* has been found sometimes alone, but usually associated with other pathogenic bacteria in such numbers that it must be considered a factor in the etiology of the affections, and in some cases there is reason for belief that it may be the primary cause." (*Reference Handbook of the Medical Sciences*.)

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(4) *Toxins* are the poisonous products of pathogenic bacteria or of ptomaines or leucomaines.

Antitoxins are substances formed in the body, of a protective character, and capable of rendering inert the poisonous products of bacteria.

Ptomaines are the putrefaction products of dead animal tissues or fluids.

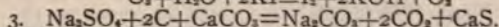
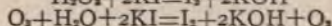
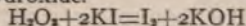
5. *Immunity* is the power of resistance of cells and tissues to the action of pathogenic bacteria. Immunity may be either natural or acquired.

Acquired Immunity is this resistance acquired: (1) by a previous attack of the disease caused by the bacteria, or (2) by the person being made artificially insusceptible. The conditions which give immunity from the pathogenic action of bacteria are:—(1) a previous attack of the disease; (2) inoculation, with small quantities of bacteria, so as to produce a mild attack of the disease; (3) vaccination; (4) the introduction of antitoxins; (5) the introduction of the toxins of the bacteria.

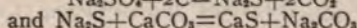
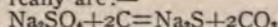
CHEMISTRY.

1. Valency is the combining power of an atom of an element as compared with that of an atom of hydrogen.

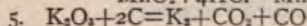
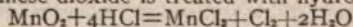
2. Ozone and hydrogen dioxide decomposes solutions of potassium iodide, with liberation of iodide and formation of potassium hydroxide.



The reactions really are:—



4. Manganese chloride, chlorine, and water are formed when manganese dioxide is treated with hydrochloric acid:



ETIOLOGY AND HYGIENE.

1. Lobar pneumonia is due to the invasion of the lung by pathogenic bacteria, chiefly the *Diplococcus pneumoniae*.

Lowered vitality, exposure to wet and cold, and alcoholism are all predisposing factors.

2. The most frequent cause of excessive secretion of HCl in the stomach is probably either (1) mental overwork or worry, or (2) alcohol or highly spiced food.

3. Progressive muscular atrophy is supposed to be due to syphilis, exposure, or overexertion.

MEDICAL RECORD.

STATE BOARD EXAMINATION QUESTIONS.

INDIANA STATE BOARD OF MEDICAL REGISTRATION AND EXAMINATION.

CHEMISTRY.

1. What is carbolic acid? Give antidote.
2. What is calomel?
3. What is the specific gravity of healthy urine? Give test for albumen, sugar, blood.
4. What is double decomposition?
5. What is the difference between the mercurous and the mercuric compounds?

MEDICAL JURISPRUDENCE.

1. What is rigor mortis? How soon after death does it begin?
2. How would you determine whether an infant was still born or had been killed after birth?

NEUROLOGY.

1. Give cause, symptoms, and diagnosis of epilepsy.
2. Give the definition of dementia.
3. Give difference between concussion and compression of the brain.

OPHTHALMOLOGY AND OTOTOLOGY.

1. How do you distinguish whether deafness is due to nerve lesions or aural lesions?
2. Give etiology, diagnosis, terminations, and treatment of chronic inflammation of the membrana tympani.
3. Give etiology, symptoms, and treatment of iritis.

PEDIATRICS.

1. Give cause and treatment for intestinal worms.
2. Give cause and treatment of nystagmus.

PHYSICAL DIAGNOSIS.

1. Define the "Argyll-Robertson" pupil. In what disease is this condition often found?
2. How would you ascertain the shape and position of the stomach?
3. At what age is the pulmonic second sound more intense than the aortic? At what age does the aortic second sound predominate?
4. Give causes and symptoms of pulmonary atelectasis.
5. How would you diagnose alcoholic coma from the coma of epilepsy?

MEDICAL RECORD.

PHYSIOLOGY.

1. Explain cell division.
2. What are the elementary tissues or structures of which the human organism is composed?
3. Give the physiologic composition of the blood with the function of each part.
4. If a sympathetic nerve be divided, what is the effect upon the blood-vessels in the parts to which the nerve is distributed, and why?
5. How long will an animal survive deprived of water?
6. Give the manner of the transmission of motor impressions.
7. Give the origin, course, and distribution of the motor impressions that effect respiratory movements.

RHINOLOGY AND LARYNGOLOGY.

1. Give some of the constitutional causes of epistaxis.
2. Give symptoms and treatment of chronic rhinitis.

ANATOMY.

1. Give diagram or brief description of (a) simple tubular, (b) simple convoluted, (c) compound racemose, and (d) compound tubular glands.
2. Give the boundaries of the thorax.
3. Give the muscles of the orbital region.
4. Give, in the order of their origin, the branches of the external carotid artery.
5. Give, in the order of their origin, the branches of the femoral artery.
6. From what regions do the lymphatic vessels convey lymph to the axillary glands?
7. Give the openings communicating with the pharynx.
8. What muscles attach to the trochanter major?
9. Give general description of the spinal cord.
10. Give the principal nerve trunks of the arm, with location of each.

ETIOLOGY AND HYGIENE.

Give cause and hygienic measures for the prevention of (1) tuberculosis, (2) typhoid fever, (3) diphtheria, (4) scarlatina, (5) variola (smallpox).

GYNECOLOGY.

1. Give pathology, etiology, and treatment of pelvic peritonitis.
2. How would you conduct a physical examination? In what position would you place your patient?
3. Describe the operation of trachelorrhaphy.
4. What are the indications for dilatation of the uterus? Give technique of dilatation.

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5. Give after-treatment in major operations (abdominal sections).
6. Define chronic metritis. Give etiology and pathology.

INTERNAL MEDICINE.

1. Define inherent body resistance to disease, and state how it may be increased.
2. Give source, habitat, symptoms, and treatment of *tænia solium* (tapeworm).
3. Give symptoms of true angina pectoris, and the pathological conditions causing it.
4. Give clinical history of gastric ulcer, and differentiate from (a) gastric carcinoma, (b) duodenal ulcer.
5. Give causes, symptoms, remote results, and treatment of cirrhosis of the liver.
6. Define hematuria, and state how you would determine the probable source of the hemorrhage.
7. Give cause, means of prevention, and treatment of bed sores.
8. In what class of diseases is general aching a pronounced symptom?
9. Give etiology, symptoms, and treatment of dysentery occurring in the temperate zones.
10. Give diagnosis and treatment of pertussis (whooping cough).

MATERIA MEDICA AND THERAPEUTICS.

1. Define preventive medicine, and give illustration of its application.
2. Give derivation of ichthyol, and its therapeutic application.
3. Give technique of introducing medicinal agents into the organism hypodermatically.
4. Name three therapeutic agents which increase the renal function.
5. Name three therapeutic agents which increase the hepatic function.
6. Name some therapeutic agents which promote constructive metabolism.
7. Name some therapeutic agents which promote destructive metabolism.
8. Name some therapeutic agents which excite the functions of the spinal cord and sympathetic.
9. Name some therapeutic agents which depress the functions of the spinal cord and sympathetic.
10. Name some therapeutic agents which are germicidal in their action.

MEDICAL RECORD.

PATHOLOGY AND BACTERIOLOGY.

1. Explain the difference between active and passive hyperemia.
2. Give the modes of infection by the tubercle bacilli; by the malarial hematozoa.
3. To what pathological conditions may passive hyperemia of the stomach be due, and to what may it lead?
4. What pathological conditions may result from abnormal conditions of the thyroid gland?
5. Give the conditions of the urine in nephritis.
6. Describe in detail the various forms of bacteria which are known to be the cause of pneumonia.
7. Name the bacteria which may cause meningitis.
8. What tissues are usually invaded by the typhoid bacilli during typhoid fever?
9. How would you prepare Löffler's blood serum?
10. Describe the staining properties of the smegma bacillus.

OBSTETRICS.

1. Describe the fetal circulation.
2. How and when should the umbilical cord be ligated and cut?
3. State causes of the rupture of the perineum and how prevented.
4. Give diagnosis and probable cause of tubal pregnancy.
5. Name diseases most commonly affecting the mammæ of the nursing mother.
6. Give cause and treatment of aphthæ.
7. Give indications and contraindications for the employment of chloroform in labor.
8. When should ergot be employed in obstetric practice?
9. State cause, diagnosis, and treatment of porrigo larvalis, or crusta lactea.
10. Give cause and treatment of vomiting of pregnancy.

SURGERY.

1. What is a compound fracture?
2. Give diagnosis of inguinal hernia.
3. What is an aneurysm?
4. Give diagnosis and treatment of appendicitis.
5. What conditions justify amputation of a limb?
6. Give symptoms and treatment of intestinal obstruction.
7. Give a description of Chopart's operation.
8. What are the symptoms and treatment of depressed fracture of skull?

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9. Give symptoms and treatment of hydrocele.
10. Give symptoms and treatment of downward dislocation of head of humerus.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

INDIANA STATE BOARD OF MEDICAL REGISTRATION AND EXAMINATION.

CHEMISTRY.

1. Carbolic acid is phenyl hydroxide: C_6H_5OH . Its antidote is alcohol or magnesium sulphate.
2. Calomel is mercurous chloride: Hg_2Cl_2 .
3. The specific gravity of healthy urine is from 1015 to 1025.

Test for *Albumin*.—The urine must be perfectly clear. If not so, it is to be filtered, and, if this does not render it transparent, it is to be treated with a few drops of magnesia mixture, and again filtered. The reaction is then observed. If it be acid, the urine is simply heated to near the boiling point. If the urine be neutral or alkaline, it is rendered faintly acid by the addition of dilute acetic acid, and heated. If albumin be present, a coagulum is formed, varying in quantity from a faint cloudiness to entire solidification, according to the quantity of albumin present. The coagulum is not redissolved upon the addition of HNO_3 .

Test for *Sugar*.—Render the urine strongly alkaline by addition of Na_2CO_3 . Divide about 6 c.c. of the alkaline liquid in two test tubes. To one test tube add a very minute quantity of powdered subnitrate of bismuth, to the other as much powdered litharge. Boil the contents of both tubes. The presence of glucose is indicated by a dark or black color of the bismuth powder, the litharge retaining its natural color.

Test for *Blood*.—To the urine add a solution of potassium hydroxide to distinct alkaline reaction; heat nearly to boiling (do not boil). A red precipitate is produced. (*Witthaus' Essentials of Chemistry*.)

4. Double decomposition is a reaction in which both of the reacting compounds are decomposed to form two new compounds.

5. The *mercurous* compounds contain the bivalent group $\left(\begin{smallmatrix} Hg \\ | \\ Hg \end{smallmatrix}\right)$ or (Hg_2) ; whereas the *mercuric* compounds contain the single, bivalent atom Hg . They also differ in their

MEDICAL RECORD.

analytic characters; thus with potassium hydroxide the *mercurous* salts give a *black* precipitate, and the *mercuric* salts a *yellow* precipitate.

MEDICAL JURISPRUDENCE.

1. *Rigor mortis* is the condition of rigidity or contraction into which the muscles of the body pass after death. It begins at a period varying from about fifteen minutes to about six hours.

NEUROLOGY.

2. "*Dementia*, when confirmed, consists in a total absence of all reasoning power, and an incapacity to perceive the true relations of things; the language is incoherent, and the actions are inconsistent; the patient speaks without being conscious of the meaning of what he is saying; memory is lost, and sometimes the same word or phrase is repeated for many hours together; words are no longer connected in meaning, as they are in mania and monomania." (Taylor's *Medical Jurisprudence*.)

3.—

CONCUSSION OF THE BRAIN.

Unconsciousness is incomplete; patient can be made to answer, though it may be briefly, and in simple words.

Special senses, though greatly blunted, are not abolished.

Power of movement not destroyed; if the position of a limb be changed the patient will resist or bring it immediately into the original position.

Respiration is quiet and feeble.

Pulse feeble, frequent, and intermittent.

The stomach sickens and rejects its contents.

COMPRESSION OF THE BRAIN.

Complete unconsciousness; may scream into patient's ear at the top of the voice, but will receive no answer.

Special senses entirely suspended.

Complete or partial paralysis; in most cases hemiplegia.

Respiration full and noisy.

Pulse full and slow, and sometimes laboring.

The stomach is insensible to any impression; no nausea or vomiting.

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CONCUSSION OF THE BRAIN.

The feces may be discharged incontinently, as may also the urine, though not usually.

Deglutition little impaired.

Pupils variable, though generally contracted; the eyelids somewhat open.

Temperature of the body less than natural.

COMPRESSION OF THE BRAIN.

Bowels are torpid, and the bladder incapable of emptying itself, though the urine may escape by overflow.

Deglutition difficult or impossible.

Pupils variable, though generally much dilated, and the eyelids closed.

Temperature almost natural, a little below the normal standard.

(From Treves' *Manual of Surgery*.)

OPHTHALMOLOGY AND OTOTOLOGY.

1. "If the ticking of a watch or the vibrations of a tuning fork are heard faintly or not at all when held at varying distances from the ear (aërial conduction), but become distinctly audible when the watch or the handle of the fork is placed in contact with the skull or mastoid process (bone conduction), the deafness is of the ordinary variety and due to aural disease. If, on the other hand, watch and fork are heard indistinctly or not at all, both in contact and at a distance, the deafness is due to some lesion of the nerve or its connections. In the first case the nerve is normal and can appreciate vibrations brought by the bone, while, through some fault in the mechanism, aërial vibrations are not transmitted to the nerve endings. In the second case the nerve is at fault and cannot appreciate vibrations, no matter how well they may be conducted." (Butler's *Diagnostics of Internal Medicine*.)

PEDIATRICS.

1. *Tapeworm* is caused by eating raw or insufficiently cooked meat containing cysticerci. *Treatment*: Give a dose of castor oil at night, and the following morning give half a dram of freshly prepared extract of male fern, and a few hours later give another dose of castor oil.

Roundworm is caused by swallowing with the food the ova of the *ascaris lumbricoides*. *Treatment*: A dose of santonin and calomel should be given at bedtime for a few nights, and a dose of castor oil the morning after the last powder.

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Seatworm, or Pinworm, is caused by swallowing the ova of the oxyuris vermicularis with the food or water, or it may be conveyed to the mouth by the fingers. Treatment: A large enema of a cold infusion of quassia. Care must be taken to prevent reinfection.

2. *Nystagmus is caused by some irritation affecting the muscles of the eye. It may be vertical or lateral, and may be due to the eye or to the central nervous system. The cause can only be determined by a study of the other symptoms associated with it. Treatment:* Tonics or bromides are sometimes useful. Remove the cause if possible. If due to occupation, the work must be changed; strabismus, or errors of refraction, must be corrected.

PHYSICAL DIAGNOSIS.

1. *Argyll-Robertson pupil* is a condition in which the pupil accommodates for distance but not for light. The condition is chiefly found in locomotor ataxia and parietic dementia.

3. The pulmonic second sound is more accentuated in childhood; the aortic second sound is more accentuated in adult life.

5. *Alcoholic coma:* The patient can generally be aroused; the coma is not, as a rule, complete; the face may be flushed; the pupils are normal or dilated; the respirations are normal in frequency, but deep; the skin is cool and moist, and the body temperature may be below normal.

Coma of epilepsy: History of attack, with previous convulsion; the coma is of brief duration, and the unconsciousness gradually becomes less; there may be a bitten tongue or other scars.

PHYSIOLOGY.

2. Epithelial tissues, connective tissues, muscular tissues, and nervous tissues.

3. *Physiological composition of the blood:*

1. Plasma.

2. Corpuscles	{ Colored.
	{ Colorless.
	{ Blood-plates.

Functions:

Plasma conveys nutriment to the tissues; it holds in solution the carbon dioxide and water which it receives from the tissues, and takes them to be eliminated by the lungs, kidneys, and skin; it also holds in solution urea and other nitrogenous substances that are taken to and excreted by the liver or kidneys.

Colored corpuscles carry oxygen from the lungs to the various tissues of the body.

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Colorless corpuscles act as a protection against bacterial invasion.

Blood-plates are supposed to take some part in the process of coagulation.

4. If a vasoconstrictor nerve is divided, the arteries supplied by it are relaxed, more blood flows to the part, the blood current is accelerated, and congestion results. If a vasodilator nerve is divided, there is little or no change in the blood-vessels supplied by it.

5. From seven to ten days, without either water or food.

6. Motor impressions travel from the cortex of the cerebrum, through the corona radiata, internal capsule, crus, pons, medulla, crossed or direct pyramidal columns, to the motor cells in the anterior horn of the spinal cord; thence through the motor nerves to the muscles indicated.

7. The origin of the impulses is at the respiratory center in the medulla. The phrenics and intercostals are the chief nerves conveying the impulses; and they are distributed to the diaphragm and intercostal muscles, respectively.

RHINOLOGY AND LARYNGOLOGY.

1. Some of the constitutional causes of epistaxis are: Hemophilia, pernicious anemia, leukemia, scurvy, purpura hæmorrhagica, cerebral congestion, hypertrophy, and valvular lesions of the heart.

I.—

ETIOLOGY AND HYGIENE.

	Caused by.
Tuberculosis	Bacillus tuberculosis, of Koch.
Typhoid fever	Bacillus typhosus, of Eberth.
Diphtheria	Bacillus diphtheriæ, of Klebs-Loeffler.
Scarlatina	Microorganism not yet ascertained.
Variola	Microorganism not yet ascertained.

INTERNAL MEDICINE.

2. *Tania Solium*. *Source*: The encysted larvæ or scolices, which come from the proscolices, which in turn are derived from the ova of the tapeworm. *Habitat*: In the larval state this parasite exists in the hog. *Symptoms*: Often there are no subjective symptoms; there may be dyspepsia, emaciation, ravenous appetite, nausea, vomiting, colicky pains, vertigo, chorea, itching of the nose. The diagnosis is made from finding segments or eggs in the dejecta. *Treatment*: The patient should be limited to a liquid diet for two days; salines should then be administered; then the oleoresin of aspidium in a dose of one to two drams, followed in a few hours by another saline. The

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treatment can only be considered successful when the head of the worm is found in the dejecta.

3. The *symptoms* of true angina pectoris are: Excruciating pain radiating from the heart to the neck, shoulder, and arm (generally the left); a sense of impending death; cardiac constriction; the face is anxious and pale; cold perspiration and sometimes dyspnea.

The pathological conditions causing it are: Arteriosclerosis, chiefly of aorta and coronary arteries; there may be myocarditis and endocarditis, chiefly associated with aortic regurgitation or adherent pericardium; the predisposing causes of arteriosclerosis may also be present, chiefly syphilis, alcoholism, and gout.

4. *Diagnosis: Gastric ulcer* is generally caused by injury or bacteria, is most apt to occur between the ages of twenty and forty-five; after eating there is pain localized in the stomach, vomiting occurs soon after eating, hematemesis is common, there is localized tenderness over the stomach, and examination of the gastric contents shows an excess of free HCl.

Gastric carcinoma does not usually occur before forty years of age, is more common in males, the pain is localized and constant, vomiting is copious and occurs some time after eating; the vomitus contains "coffee ground" material; hemorrhages are common; a tumor may be palpated, and examination of the gastric contents shows absence of free HCl and presence of lactic acid; severe anemia and cachexia are also present.

In *Duodenal ulcer* the pain is apt to be more to the right, and to occur at an interval of two or three hours after meals; the hemorrhages will be intestinal, and the blood will be passed by way of the bowels, and not vomited. In many cases the symptoms are identical with those of gastric ulcer.

6. *Hematuria* means blood in the urine. In *renal hematuria* the blood and urine are intimately mixed, tube casts are apt to be present, and there may be renal colic or pain in the lumbar region. In *vesical hematuria* the blood and urine are not so well mixed, and pure blood is apt to be passed at the end of urination. In *urethral hematuria* the urine first passed is bloody.

7. *Bedsore*s may be caused by undue pressure and irritating secretions; a crease or fold in a sheet, a crumb of bread, a feather, or a bit of string on the sheet may cause them. Especially is this so when the skin is irritable from excessive perspiration, inefficient washing, or involuntary passages of urine. Bedsore are particularly common in spinal affections and in wasting diseases.

Prevention consists in reducing the pressure, careful re-

MEDICAL RECORD.

peated washing, drying, and dusting with zinc oxide, and subsequent protection with lint or cotton-wool, etc. Leather-backed adhesive plaster may be applied over bony prominences, or, if seen early, collodion may be used. Frequent rubbing with alcohol may prove a preventive. When congestion appears, a water-bed or air-cushion may be used. Spirits of camphor or glycerol of tannin may be rubbed in twice daily, to harden the skin. Salt and alcohol (two drams to the pint) may also be used.

Treatment: A solution of silver nitrate may be used when the skin is about to break, in the strength of gr. 20 to the ounce; and in solution of gr. 10, daily, when the skin breaks. The sloughs should be removed as fast as they form. Stimulation, good nourishment, and sleep are valuable in treatment. (From Gould and Pyle's *Cyclopedia of Medicine and Surgery*.)

8. General aching is a pronounced symptom in some of the acute infectious fevers such as influenza, dengue, and smallpox. It may also be present in tonsillitis, rheumatism, and syphilis; also in poisoning by lead or mercury.

MATERIA MEDICA AND THERAPEUTICS.

1. Preventive medicine is the application of medical science to the task of preventing or mitigating disease. *Example:* Vaccination to prevent smallpox.

2. Ichthyol is obtained from ichthyosulphuric acid, which comes from a crude oil obtained by destructive distillation of fossil fish found in the earth in the mountains of Tyrol. It is used in inflammatory conditions generally, erysipelas, rheumatism, and certain chronic skin diseases.

4. Three therapeutic agents which increase the renal function: (1) Water, (2) alcohol, (3) spirits of nitrous ether.

5. Three therapeutic agents which increase the hepatic function: (1) Sodium salicylate, (2) corrosive sublimate, (3) podophyllin.

6. Some therapeutic agents which promote constructive metabolism: Iron and its preparations, potassium permanganate, bismuth, arsenic, cinchona and its preparations, mineral acids, phosphorus, massage, fresh air.

7. Some therapeutic agents which promote destructive metabolism: Iodine, potassium, sodium, lithium, mercury, calcium, barium and their preparations; vegetable acids.

8. Some therapeutic agents which excite the functions of the spinal cord and sympathetic: Alcohol, strychnine, electricity, massage, ether, camphor, digitalis, sparteine, ergot.

9. Some therapeutic agents which depress the functions of the spinal cord and sympathetic: Opium, belladonna,

MEDICAL RECORD.

large quantities of alcohol, chloral hydrate, aconite, physostigma, pilocarpus, tobacco, amyl nitrite.

10. Some therapeutic agents which have a germicidal action: Oxygen, sulphur, corrosive sublimate, carbolic acid, iodine, chlorine, staphisagria, heat, formaldehyde, creolin.

PATHOLOGY AND BACTERIOLOGY.

1. *Active hyperemia* means that there is an excess of arterial blood in a part, and is generally accompanied by an increase in the rate of blood flow. In *passive hyperemia* there is still an excess of blood, but it is in the veins and capillaries; and the blood flow is retarded.

2. Modes of infection by the *tubercle bacilli*: (1) By inhalation, (2) by inoculation, (3) by being taken in with food.

Mode of infection by the *malarial hematozoa*: By the bite of the anopheles mosquito.

3. Passive hyperemia of the stomach may be due to cirrhosis or other hepatic diseases causing portal obstruction, also to some pulmonary disorders which interfere with the flow of blood from the right ventricle. It may lead to chronic gastritis.

4. Cretinism, goiter, myxedema, cachexia strumipriva.

5. "*Acute Diffuse Nephritis*.—The urine is greatly diminished in amount (four or five ounces in twenty-four hours), or is even totally suppressed. It is smoky, blackish, or of a chocolate color. The specific gravity is high. Albumin is found in large amount, and the heavy deposit contains abundant red corpuscles, blood, hyaline, and epithelial tube casts. The total urea is lessened.

"*Chronic Diffuse Nephritis*.—The quantity of urine is diminished, it is cloudy from urates, the specific gravity may be high in the early, but is low in the later stages. Albumin is abundant, sometimes more so than in any other disease. The heavy sediment contains large numbers of nearly all the varieties of tube casts, hyaline, epithelial, granular, and fatty. The latter are especially characteristic. Occasional red corpuscles, many leucocytes, and numbers of degenerated epithelial cells are also found. The amount of urea is decreased.

"*Chronic Interstitial Nephritis*.—The urine is increased in quantity, light yellow, clear, with a persistently low specific gravity. Albumin is scanty, occurring in traces, and is sometimes absent. A few narrow hyaline casts are almost constantly found in the very small deposit. Cellular elements are as a rule no more abundant than in normal urine. Polyuria, persistent low specific gravity, and the presence of a few hyaline casts constitute the urinary signs of this disease. Albumin may or may not be present in

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small quantity." (Butler's *Diagnostics of Internal Medicine*.)

7. The bacteria which may cause meningitis are: (1) *Diplococcus intracellularis meningitidis*, (2) the pneumococcus, (3) *Streptococcus pyogenes*.

8. The tissues usually invaded by the typhoid bacilli during typhoid fever are: The lymphoid tissue of the small intestine, lymph nodes of the mesentery, the spleen, gall-bladder, urinary bladder.

9. Löffler's blood serum consists of one part of bouillon (containing one per cent. of glucose) and three parts of liquid blood serum. This should be well mixed, poured into tubes, and sterilized, or raised to 65° C. one hour a day for three days.

10. The smegma bacillus is like the tubercle bacillus in that it stains with carbolfuchsin and resists the decolorizing action of dilute mineral acids. But it is decolorized by absolute alcohol.

OBSTETRICS.

4. *Diagnosis*: "When extrauterine pregnancy exists there are: (1) The general and reflex symptoms of pregnancy; they have often come on after an uncertain period of sterility; nausea and vomiting appear aggravated. (2) Then comes a disordered menstruation, especially metrorrhagia, accompanied with gushes of blood, and with pelvic pain coincident with the above symptoms of pregnancy; pains are often very severe, with marked tenderness within the pelvis; such symptoms are highly suggestive. (3) There is the presence of a pelvic tumor characterized as a tense cyst, sensitive to the touch, actively pulsating; this tumor has a steady and progressive growth. In the first two months it has the size of a pigeon's egg; in the third month it has the size of a hen's egg; in the fourth month it has the size of two fists. (4) The os uteri is natulous; the uterus is displaced, but is slightly enlarged and empty. (5) Symptoms No. 2 may be absent until the end of the third month, when suddenly they become severe, with spasmodic pains, followed by the general symptoms of collapse. (6) Expulsion of the decidua, in part or whole. Nos. 1 and 2 are *presumptive signs*; Nos. 3 and 4 are *probable signs*; Nos. 5 and 6 are *positive signs*." (*American Text-Book of Obstetrics*.)

Probable cause: Some pathological condition in the Fallopian tube which obstructs the passage of the fecundated ovum. The most common condition is salpingitis, especially of the gonorrheal variety.

5. Sore nipples; caked breast; mastitis, which may be subcutaneous, parenchymatous, or submammary; galactoceles.

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6. *Cause of Aphthæ*: Predisposing causes are uncleanness, lack of hygienic conditions, improper feeding. The exciting cause is unknown; various microorganisms have been found in this condition, but none of them is recognized as the etiological factor.

Treatment: Cleanliness, proper hygiene, proper feeding, mouth wash of salt solution or boric acid; the ulcers may be brushed with a nitrate of silver solution (5 to 10 grains to the ounce), and a dose of castor oil or a few grains of calomel (in divided doses) should be administered.

SURGERY.

5. Conditions which justify amputation of a limb are: "Any injury, disease, or malformation rendering retention of the limb incompatible with life or comfort; avulsion of limb; compound fracture; compound dislocation; fracture with great comminution of bone; laceration of important vessels; extensive contusion; extensive laceration; gunshot injuries; aneurysm; effects of heat and cold; gangrene; extensive bone disease; tumors; elephantiasis; tetanus; snake bite; deformities." (Bickham's *Operative Surgery*.)

STATE BOARD EXAMINATION QUESTIONS.

KANSAS STATE BOARD OF MEDICAL REGISTRATION AND EXAMINATION.

ANATOMY AND HISTOLOGY.

1. Locate the brachial plexus and its branches, naming the latter.
2. Describe the medulla oblongata.
3. Locate and describe a femoral hernia and name its coverings, beginning with the surface.
4. Describe the intestinal tract and name its divisions.
5. Locate and describe the omentum, giving the histology of the same.
6. Describe the vulvulæ conniventes.
7. Locate and describe the pancreas, giving its histology.
8. Give the histology of the arteries. Does it differ from the histology of the veins? If so, how?
9. Describe the sympathetic nerve, naming its divisions, and number of ganglia in each.
10. How many bones are there in the human skeleton?

CHEMISTRY AND TOXICOLOGY.

1. What is galvanism?
2. How can it be demonstrated that hydrogen is lighter than air?

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3. What is analysis and what is synthesis?
4. What is the effect of inhaling air rich with ozone on the respiratory organs?
5. In what manner does arsenic prove poisonous?
6. How does CO act as a poison?
7. What is the action of KOH on the tissues?
8. What is the antidote for acute poisoning by HgCl₂?
9. What is the reaction of blood during gout?
10. What is Trommer's test for sugar in urine?

OBSTETRICS.

1. Write a page on deformities of the pelvis.
2. What would you do in a case of postpartum hemorrhage?
3. How would you treat a case of hour-glass contraction?
4. Write a page on puerperal eclampsia.
5. How would you treat a case of pelvic cellulitis?
6. Into how many stages is labor divided?
7. How would you treat a case of face presentation?
8. How would you treat a case of adherent membranes?
9. Write a page on the use of the forceps.
10. How would you treat fibroid tumors of the uterus?

PATHOLOGY.

1. Define gangrene.
2. What is a sarcomatous tumor? Give its pathology.
3. Define chronic gastritis and give its pathology.
4. Give symptoms, etiology, pathology, diagnosis and prognosis of herpes zoster.
5. Give symptoms, etiology, and prognosis of erysipelas.
6. Give etiology, symptoms, diagnosis, and prognosis of neuritis (multiple).
7. Define lithemia.
8. Define purpura hæmorrhagica.
9. Give differential diagnosis of septicemia and pyemia.
10. Describe the pathology of rachitis.

BACTERIOLOGY.

1. How do bacteria multiply?
2. What is essential to the life of bacteria?
3. Name and describe the malarial parasites.
4. What disease does the bite of an infected *Stegomyia fasciata* produce?
5. Name five culture media.
6. Name and describe the pus-producing germs.
7. Describe Widal's test for typhoid fever.
8. What are leucocytes, and what occurs when they come in contact with pathogenic bacteria?

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9. What are ptomaines and toxins?
10. What are sterilization, antiseptics, disinfectants, and germicides?

PHYSIOLOGY.

1. What are the functions of the spinal cord?
2. What is the origin of urea and of uric acid?
3. (a) Describe the vasomotor nervous system and explain its functions. (b) Where is the vasomotor center located?
4. (a) Give the function of the suprarenal glands. (b) What is result of their extirpation?
5. What kind of membrane lines the mastoid cells, and why?
6. Explain the portal circulation.
7. (a) What are the functions of bile? (b) Give its constituents.
8. Describe the pleuræ, giving kind of tissue and functions.
9. (a) Give functions of the cerebellum. (b) What is the result of its extirpation?
10. Give the functions of the medulla oblongata. (a) Name the "centers" located in the bulb.

SURGERY.

1. What class of patients take ether better than chloroform, and why? What class take chloroform better, and why?
2. What are the signals of danger in general anesthesia?
3. How would you treat a suppurating cavity of the thorax?
4. What is the proper surgical treatment of a chronic varicose ulcer of the leg? Give details.
5. What is osteoplasty, and in what part of the body is it most frequently called for? Give an example.
6. Give the cause and treatment of *painful* cicatrix, *adherent* cicatrix, *contracted* cicatrix, and *exuberant* cicatrix.
7. What kinds of tumors are most safely removed? What kinds are the least safely removed?
8. How would you treat an ingrowing toenail? Give full details.
9. What is the best surgical treatment for hemorrhoids? Give details.
10. What bone in the body is frequently fractured and is the most difficult of all bones to reunite by bony union? How should it be treated when fractured? Give details.

OPHTHALMOLOGY, OTOTOLOGY, RHINOLOGY, AND MEDICAL JURIS-PRUDENCE.

1. Name some causes of ozena.

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2. Discuss the pathological characteristics of nasopharyngeal adenoids.
3. Define strabismus. What causes it?
4. Describe the crystalline lens and give its relations.
5. The vast majority of all the diseases of the ear have their origin in inflammations of what particular membrane?
6. Prescribe for chronic case of otitis media purulenta.
7. Nasal polypi—give diagnosis and surgical treatment.
8. What do you understand by medical jurisprudence?
9. What constitutes a dying statement, and what conditions are necessary to make it admissible as evidence in a court of justice?
10. Give diagnostic symptoms between diphtheria and follicular tonsillitis.

THEORY AND PRACTICE.

1. Write a page on epidemics.
2. Write a page on the treatment of typhoid fever.
3. Give diagnosis and treatment of scarlet fever.
4. Give treatment of erysipelas.
5. Give diagnosis and treatment of rickets.
6. Give diagnosis and treatment of acute laryngitis.
7. Write a page on pneumonia.
8. Describe the different murmurs of the heart and ten what they indicate.
9. Give treatment for acute peritonitis.
10. Write a page on Bright's disease.

MATERIA MEDICA.

1. In what disease is opium used principally?
2. Name the excitomoters.
3. What are the preparations and doses of conium?
4. Is ether ever used as a cardiac stimulant?
5. How should poisoning by digitalis be treated?
6. What are the medicinal uses of ipecac?
7. What substances are incompatible with belladonna?
8. What are the effects, uses, and doses of calcium chloride?
9. What are the preparations and doses of gold salts?
10. Name the mineral tonics.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

KANSAS STATE BOARD OF MEDICAL REGISTRATION AND EXAMINATION.

CHEMISTRY AND TOXICOLOGY.

1. By the term Galvanism is meant current electricity derived from chemical action, in opposition to that pro-

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duced by heat or induction. The term is no longer used scientifically; but is laxly employed to denote the constant current as distinguished from the induced current (which is sometimes called Faradism or Faradization).

2. Soap-bubbles or a toy balloon, if filled with hydrogen gas, will rise rapidly in the air.

3. *Analysis* is the splitting up of a compound into its elements or into simpler compounds. *Synthesis* is the building up of a compound from elements or from simpler compounds.

4. It causes severe coryza and hemoptysis.

5. By the ingestion of flypaper, or the water in which it has been placed, poisoning by *elementary arsenic* may be caused. By the inhalation of hydrogen made from zinc and sulphuric acid containing arsenic, poisoning by *Arsin* may be produced. *Arsenic trioxide* can cause poisoning by being absorbed from the mouth, stomach, rectum, vagina, or urethra; or by absorption from the skin in the use of parasitocides or cancer cures containing arsenic; also by inhalation of dust from wallpapers containing arsenic; from clothes dyed with arsenic; and by the ingestion of rat poisons, etc.

6. By uniting with the hemoglobin of the blood and forming a more stable compound than oxyhemoglobin. In this way the power of the red corpuscles to carry oxygen from the air to the tissues is destroyed; and asphyxia is thus produced.

7. It acts as a caustic on living tissues; and disintegrates all tissues, whether dead or alive.

8. White of egg, in not too large a quantity, and followed by an emetic.

9. Alkaline; but the degree of alkalinity may be lowered, and uric acid crystals may be found in the blood.

10. Place in a test tube some urine free from albumin; add a few drops of a solution of cupric sulphate, and then some liquor potassæ (about half as much as the urine); shake and boil. A yellow or red precipitate is formed in the presence of sugar.

OBSTETRICS.

3. First, give a hypodermic of morphine and atropine, or a dose of chloral or an anesthetic, and then, with one hand in the vagina, gently introduce the index and middle fingers into the uterus and through the constricting band. After a time the resistance of the constriction will be thus overcome. By pressing the uterus downward, the fingers and the border of the placenta are brought in contact. Effort is then made to bring part of the placental mass through the constriction; the placenta being removed as in case of adherent placenta.

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5. The vagina should be made as aseptic as possible, by means of vaginal douches of bichloride of mercury 1:2,000. The vaginal vault and the cervix uteri can then be painted with tincture of iodine; sometimes the insertion of a vaginal suppository containing about thirty grains of iodoform is of benefit. In case suppuration occurs, the abscess should be opened; if it bursts into the rectum or vagina, measures must be instituted for drainage and disinfection. Very frequently an abdominal operation is necessary. Antipyretics should be given for the fever; and for the pain cold compresses or ice bags should be applied to the perineum and lower part of the abdomen.

7. If the chin is presenting anteriorly, expectant treatment may suffice; but care must be taken to observe that the chin does not rotate backwards. Spontaneous version may occur, and the presentation become a vertex one. Failing this, or as a means of favoring this, postural treatment, such as Walcher's position, has been recommended. If, in spite of this, engagement has not occurred, cephalic version is indicated, care being taken not to rupture the membranes. If this is not successful, podalic version should be tried. If, after all these manipulations, the child is still alive and the head is engaged, symphyseotomy is indicated; if the child is dead, craniotomy should be performed.

PATHOLOGY.

1. Gangrene is the complete and permanent loss of vitality in a considerable area of tissue.

2. A sarcomatous tumor is one arising from connective tissue, with excessive cell formation and very little intercellular substance. The cells are either embryonic or imperfectly developed connective tissue cells. Sarcomata are always mesoblastic in origin; their blood supply is abundant, and it is through this channel that they are disseminated; of their lymphatics and nerve supply nothing is known. In gross appearance sarcomata are of a more or less homogeneous nature, the color depending upon the quantity of blood present; occasionally a milky fluid can be expressed, but there is never anything corresponding to the "cancer-juice" of carcinomata. Sarcomata may undergo various secondary changes, such as fatty degeneration, hemorrhages, and mucoid softening. Sarcomata are malignant, hence they have a tendency to spread to distant organs (metastasis), are heterologous, have no definite limiting capsule, tend to infiltrate the surrounding tissues, tend to recur after removal, and cause cachexia and death. They have been classified in a variety of ways: (1) according to the cells, as round cell sarcoma, spindle cell sarcoma, giant cell sarcoma, mixed cell sarcoma; (2) according to

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the *stroma*, as fibrosarcoma, myxosarcoma, chondrosarcoma, osteosarcoma; and (3) according to *secondary changes*, as melanosarcoma, liposarcoma, chloroma.

7. Lithemia is a condition due to imperfect metabolism, and is characterized by an accumulation of uric acid or urates in the blood. It differs from gout in the absence of joint involvement.

8. Purpura Hæmorrhagica is a disease of unknown origin, and is characterized by hemorrhages into the skin and mucous and serous membranes, and usually runs a rapid and fatal course.

9. *Septicemia* begins with a rigor, followed by a rise of temperature up to about 104° F., which remains constant. The pulse is weak and progressively rapid; there is anorexia and constipation, which is followed by diarrhea; the urine contains albumin; the temperature may become subnormal. There are no repeated rigors and no secondary (metastatic) abscesses. *Pyemia* begins with a rigor, which may last for half an hour, and is repeated every one or two days. The temperature rises as in septicemia, but rapidly falls, and at the same time the patient suffers a profuse perspiration. The pulse is weak and rapid; there is anorexia; and there may be delirium, with jaundice and signs of abscesses in the lungs, joints, etc. In pyemia there are repeated rigors and secondary abscesses.

BACTERIOLOGY.

1. Bacteria multiply by fission and by sporulation.

2. Most bacteria require (1) proper temperature, generally at or near that of the body; (2) oxygen is generally needed, those that cannot live without it being called *aërobic*, and those that can grow without it, *anaërobic*; (3) nutriment of a proper kind, containing both organic and inorganic material; (4) a slight degree of moisture; (5) a medium of slightly alkaline reaction; and (6) rest. Individual bacteria may require modifications of the above essentials.

4. Yellow fever.

5. Gelatin, agar, potato, bouillon, and blood-serum.

6. The pus-producing bacteria are: *staphylococcus pyogenes aureus*, *staphylococcus pyogenes albus*, *staphylococcus pyogenes citreus*, *staphylococcus cereus aureus*, *staphylococcus cereus albus*, *staphylococcus cereus flavus*; *streptococcus pyogenes*; *micrococcus tetragenus*, *micrococcus pyogenes tenuis*; *gonococcus*; *pneumococcus*; *bacillus pyocyaneus*, *bacillus typhosus*, and *bacillus tuberculosis*.

8. Leucocytes are white blood corpuscles. When they come in contact with pathogenic bacteria, if the conditions are favorable, they devour and destroy the bacteria (phago-

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cytosis); sometimes, however, the bacteria manage to destroy the leucocytes.

9. *Ptomaines* are the putrefactive products of dead animal tissues or fluids.

Toxins are the products of pathogenic bacteria or of ptomaines or leucomaines, and are actively poisonous.

10. *Sterilization* is the process of freeing a substance from the live bacteria that may be on it or in it.

Antiseptics are agents which prevent or restrain putrefaction.

Disinfectants are agents which restrain infectious diseases by destroying or removing their specific poisons.

Germicides are agents which destroy bacteria and their germs.

PHYSIOLOGY.

1. The functions of the spinal cord are: (1) the conduction of nerve impulses; (2) reflex action; (3) coordination; it also contains special centers which preside over definite functions.

2. *Urea* is derived from the nitrogenous food ingested; it is manufactured by the cells of the liver.

Uric acid: "In man uric acid has a twofold origin; one portion, coming from the breaking down of the nuclein-containing tissues or cell elements of the man's own body, and hence is of endogenous origin, while the other portion—usually the larger—is of exogenous origin, coming from the transformation of free and combined purin compounds present in the food." (Chittenden.)

3. The vasomotor nervous system consists of (1) a vasomotor center in the bulb, (2) of some subsidiary centers in the spinal cord, and (3) of vasomotor nerves, which are of two kinds: (a) those causing constriction of the vessels, and so-called vasoconstrictor nerves; and (b) those causing dilatation of the vessels, and so-called vasodilator nerves. These nerves supply the muscle tissue in the walls of the blood-vessels and regulate their caliber, thus influencing the *quantity* of blood supplied to a part; at the same time they regulate the *quality* of blood supplied to a part; they also regulate the *nutrition* of a part, also *secretion* and *heat production*. They are concerned, too, in the control of the heart-beat. The center is in the medulla, in the floor of the fourth ventricle, near the calamus scriptorius.

4. The function of the suprarenal glands is unknown; it is supposed that they are able to destroy or remove some toxic substance produced elsewhere in the body. Removal of these glands is rapidly followed by death.

5. The mastoid cells are lined by epithelium, continuous with that of the tympanic cavity.

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7. The functions of the bile are: (1) to assist in the emulsification and saponification of fats; (2) to aid in the absorption of fats; (3) to stimulate the cells of the intestine to increased secretory activity, and so promote peristalsis, and at the same time tend to keep the feces moist; (4) to eliminate waste products of metabolism, such as lecithin and cholesterol; (5) it has a slight action in converting starch into sugar; (6) it neutralizes the acid chyme from the stomach, and thus inhibits peptic digestion; (7) it has a very feeble antiseptic action.

The constituents of the bile may be shown in the following table, which presents the averages of three analyses given by Hammarsten; the results are given in parts per thousand:

Water	971.380
Solids	28.620
Mucin and pigments.....	4.910
Bile salts.....	12.197
Taurocholate	2.431
Glycocholate	9.766
Fatty acids from soaps....	1.243
Cholesterol	1.200
Lecithin and fats.....	0.970
Soluble salts.....	7.360
Insoluble salts.....	0.317

9. The functions of the cerebellum are: (1) coordination, (2) equilibrium. Removal of the cerebellum causes loss of these functions.

10. The functions of the medulla are: (1) Conduction of nerve impulses and impressions, (2) as an independent reflex center.

The "centers" located in the bulb are: (1) center for mastication, (2) for secretion of saliva, (3) for sucking, (4) for deglutition, (5) for vomiting, (6) for voice, (7) center for expression (8) cardiac centers, (9) respiratory centers, (10) vasomotor centers.

SURGERY.

2. The danger signals are: (1) lividity or extreme pallor of the face, (2) feeble, irregular, or intermittent pulse, (3) slow and shallow respiration, (4) dilatation of the pupils during deep narcosis.

5. By osteoplasty is meant the transplantation of bone (with periosteum). It is most frequently performed on the skull.

6. Painful cicatrix is caused by the pressure of a contracting cicatrix upon the cut end of a nerve or by the inclusion of a nerve in the scar of an amputation stump. In the former case the painful part should be excised; in

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the latter the stump must be opened and the end of the affected nerve removed.

Adherent cicatrix is caused by simultaneous injury (such as burns or scalds) to contiguous and approximated parts, such as the fingers, or the pinna and the side of the head. A plastic operation is indicated.

Contracted cicatrix is most apt to occur in the flexure of a joint; a serious burn of the hand may cause flexion-contraction of the fingers. The treatment is to divide the cicatrix, dissect out the scar, and follow with skin-grafting.

Exuberant cicatrix consists of a hyperplasia of scar tissue, it is most often found in tuberculous patients, and is of unknown etiology. Excision is useless, as it is very apt to recur. Sometimes it disappears spontaneously.

10. The patella. It is best treated by open operation and wiring.

OPHTHALMOLOGY, OTOTOLOGY, RHINOLOGY, AND MEDICAL JURISPRUDENCE.

1. (1) Atrophic nasal catarrh, due to syphilis, glanders, caries, or necrosis of the nasal bones; (2) ulcers of a syphilitic, lupoid, or tuberculous origin; (3) foreign bodies and new growths in the nose or nasopharynx.

2. Adenoids consist of lymphoid tissue, which is composed of masses of round cells held together by connective tissue. Mucous glands may be found in the deeper parts of the lymphoid tissue; and the whole is covered with ciliated columnar epithelium.

3. Strabismus, or squint, is a condition in which the lines of sight of the two eyes are not directed towards the same object of vision.

The causes are: (1) disturbances of equilibrium of the ocular muscles; (2) errors of refraction; (3) opacities in the cornea or lens; (4) intraocular disease.

5. The membrana tympani.

6. R. Acidi borici gr. xxx
Zinci sulphatis gr. xvj
Glycerin ʒij
Aquæ destillatæ ʒij. M.

Sig. A few drops to be instilled into the ear several times a day.

8. Medical jurisprudence is the application of the knowledge of any of the branches of medicine to the problems and requirements of the law.

9. Any statement made by a dying person who believes that he cannot recover and that he is, at that very time, in actual danger of death. The statement need not be sworn to; it should be voluntary and sincere; and it is admissible as evidence in a court if the individual dies.

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10. In *diphtheria* the onset is more gradual; the temperature rises to about 101° to 103° F.; the tonsils are not much enlarged; there is an exudate of a thick grayish membrane which is very adherent, is removed only with difficulty, and leaves a bleeding surface; this membrane soon re-forms and may be found on the fauces and pharynx as well as on the tonsils; in the exudate the Klebs-Löffler bacilli may be found.

In *follicular tonsillitis* the onset is more sudden; the temperature may be a little higher than that of diphtheria; there is no membrane, but the tonsils are red and swollen, and in the crypts are seen white cheesy spots or plugs, which consist of broken-down epithelium, and are easily brushed away; Klebs-Löffler bacilli are not found.

THEORY AND PRACTICE.

8. (1) A systolic murmur, soft and blowing, heard best at the apex, and transmitted to the left axilla and toward the angle of the left scapula, indicates mitral regurgitation. (2) A presystolic murmur, harsh and rough, heard best very near the apex, and not transmitted, denotes mitral stenosis. (3) A diastolic murmur, soft, heard best in the second right intercostal space, and transmitted down the sternum or toward the apex, denotes aortic regurgitation. (4) A systolic murmur, harsh, heard best in the second right intercostal space, and transmitted into the carotids, denotes aortic stenosis. (5) A systolic murmur, heard best over the lower end of the sternum, denotes tricuspid regurgitation. (6) A presystolic murmur, heard best over the ensiform cartilage, and not transmitted, denotes tricuspid stenosis. (7) A diastolic murmur, heard best in the second left intercostal space, denotes pulmonary regurgitation. (8) A systolic murmur, heard best in the second left intercostal space, and not transmitted to the large vessels of the neck, denotes pulmonary stenosis. (9) A murmur, usually systolic, soft, and blowing, heard best over the pulmonic area, associated with evidences of chlorosis or anemia, and affected by the position of the patient, is a hemic or functional murmur, and denotes as a rule an impoverished condition of the blood.

MATERIA MEDICA.

1. In diabetes; particularly diabetes mellitus.
2. Nux vomica and ignatia (and their alkaloids strychnine and brucine), thebaine, ammonia, ether, chloroform, opium, ergot, alcohol in small doses.
3. Conium, three grains; fluid extract of conium, three minims.

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4. Yes; on account of the rapidity of its action, ether is a very valuable cardiac stimulant.

5. The patient must be kept in the recumbent position; the stomach should be washed out with infusion of tea; give stimulants and keep the patient warm; tannic acid may be given, as the chemical antidote; and tincture of aconite, as the physiological antidote.

6. Ipecac is used externally as an antiseptic, in cases of anthrax. Internally as a stomachic, an expectorant, an emetic, a diaphoretic, and a cholagogue. It is given in cases of dyspepsia, dysentery, bronchitis, asthma, croup, and in the vomiting of pregnancy.

7. The caustic alkalies are incompatible with belladonna.

8. It is an irritant; applied externally it hastens the coagulation of the blood and makes a firmer clot. It is used in cases of gastric catarrh and fermentative dyspepsia, in hematemesis and hemoptysis, in glandular swellings of tuberculous patients. It has also been employed in the treatment of pneumonia and phthisis. The dose is seven and a half grains.

9. Auri et sodii chloridum is the only official gold salt; dose, one-tenth of a grain.

10. Iron, manganese, arsenic, bismuth, and phosphorus.

STATE BOARD EXAMINATION QUESTIONS.

STATE BOARD OF HEALTH OF KENTUCKY.

ANATOMY.

1. Describe (*a*) the gracilis, (*b*) gastrocnemius, (*c*) rectus femoris, giving origin and insertion of each.

2. Describe the pancreas.

3. Name the structures to be divided in operating for strangulation of an oblique inguinal hernia.

4. Describe the fourth cervical vertebra and distinguish it from the fourth dorsal vertebra.

5. Bound the axilla and name and give relations of structures in axillary space.

6. Name the muscles, nerves, and arteries severed by a cross section of the thigh at the junction of the middle and lower thirds.

7. Describe (*a*) the superficial and deep palmar arches, (*b*) the brachial artery, branches and relationship.

8. Describe and give contents and relations of parts in Scarpa's triangle.

9. Describe (*a*) the superior longitudinal sinus (*b*) the lateral sinus, (*c*) torcular Herophili.

10. Give the anatomy of the liver.

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SURGERY.

1. Give varieties of hernia; describe one operation for inguinal hernia.
2. (a) Name different kind of fractures and give differential diagnosis between fracture of the neck of the femur and dislocation of hip. (b) Give treatment of the latter.
3. How would you make a diagnosis of gonorrhea? Give a bacteriological examination.
4. What is empyema? Give diagnosis, prognosis, and treatment.
5. Give symptoms, diagnosis, and treatment of intestinal obstruction.
6. How would you diagnose retention of urine? What would you do for it?
7. How would you determine that a limb is injured beyond hope in a crushing accident?
8. What are the indications for appendectomy?
9. Give the treatment of shock resulting from hemorrhage.
10. Give contraindications to the employment of ether and chloroform?

MEDICAL JURISPRUDENCE.

1. What constitutes expert testimony?
2. How would you determine that a full term dead baby was born alive?
3. How would you determine (a) that a wound was inflicted by a blunt instrument? (b) or that it was done before or after death?
4. Differentiate between idiocy and lunacy.
5. What is paresis? Give symptoms, prognosis, and treatment.

OPHTHALMOLOGY.

1. Differentiate iritis and glaucoma, giving symptoms of each.
2. Describe and give etiology of (a) phlyctenular keratitis and (b) interstitial keratitis.
3. What is ophthalmia neonatorum? Give etiology and the probable results of a badly managed case.
4. Give symptoms and etiology of ciliary blepharitis.
5. Differentiate myopia and hyperopia and hypermetropia; give the anatomical reasons for their existence, and tell what you would recommend for the relief of each.

PHYSIOLOGY.

1. (a) Give several varieties of food. (b) Which enzymes act on each variety?
2. (a) Describe absorption, and give the function of the lymphatics. (b) Describe the thoracic duct.

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3. Give chemistry and uses of bile.
4. Describe the circulation of the blood. What forces govern it?
5. Give histology of the kidney and function of the various structures.
6. Name and give the function of each of the cranial nerves.
7. Describe and give functions of sympathetic nervous system.
8. What are the functions of the skin?
9. Describe the blood.
10. Describe the cardiac cycle.

OBSTETRICS AND GYNECOLOGY.

1. Define presentation and position.
2. Tell exactly how you would manage a shoulder presentation.
3. What is mensuration? (b) How is it conducted in obstetrical cases? (c) How is it of value?
4. How would you diagnose and conduct the delivery of a hydrocephalic fetus?
5. (a) What would you suspect in antepartum hemorrhage? (b) How confirm your diagnosis? (c) How manage the case?
6. (a) When is ventrofixation indicated? (b) What is ballottement, (c) when is it valuable and how is it performed?
7. Give diagnosis of extrauterine gestation.
8. Give symptoms and pathology of carcinoma uteri.
9. Describe ovary and uterus during stages of menstruation.
10. (a) Give two indications for hysterectomy (b) Reasons for preferring abdominal or vaginal method.

CHEMISTRY.

1. What is (a) an atom? (b) a molecule? (c) What are isomeric compounds?
2. (a) What are the symptoms of acute arsenic poisoning? (b) What is the chemical combination of its antidote and how does it act? (c) Tell in detail how to detect arsenic in the stomach of a case of suspected poisoning.
3. Describe in detail a method for the quantitative estimation of sugar in the urine.
4. Tell in detail how to detect bile in the urine.
5. (a) Contrast dairy milk with human milk, and (b) give a brief description of the essentials for the production of pure dairy milk.
6. What is (a) H_2SO_4 , (b) BaO_2 , (c) HCl , (d) HNO_3 ? (e) What is the formula for methyl alcohol?

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7. (a) What is acetphenetidin? (b) hexamethylene- tetramine? (c) From what are they prepared?
8. (a) Describe oxygen. (b) Give its formula, (c) valency, (d) atomic weight. (e) Tell how to prepare it, and give formula of your method.
9. (a) What is specific gravity? (b) How obtained for solids, (c) liquids, (d) gases?
10. Describe the chemical changes in starch during digestion in detail, giving formulas.

NERVOUS DISEASES.

1. Give etiology of migraine.
2. Give etiology and symptoms of sciatica.
3. Describe (a) epilepsy, (b) catalepsy.
4. Describe a case of progressive bulbar paralysis.
5. Differentiate between (a) illusions, (b) delusions, (c) hallucinations.

PREVENTIVE MEDICINE.

1. How long after recovery would you keep in quarantine a case of (a) diphtheria, (b) scarlet fever, (c) smallpox?
2. Name the portals of entry of tubercular infection in the order of their importance.
3. Describe in detail just how you would manage cases of typhoid fever for the protection of the community.
4. How would you disinfect a room after a communicable disease?
5. What is the difference between contagion and infection?

PRACTICE.

1. Define constipation; give etiology, diagnosis, and prognosis.
2. Define vertigo; give varieties and diagnosis.
3. Define myxedema; give etiology, diagnosis, and prognosis.
4. Define hydrothorax; give etiology, diagnosis and prognosis.
5. Define angina pectoris; give etiology, diagnosis, and prognosis.
6. Define asthma; give etiology, diagnosis, and prognosis.
7. Define adenoids; give etiology, symptoms, and dangers.
8. Define enterocolitis in a child; give etiology, diagnosis, and prognosis.
9. Give essentials for the production and preservation of pure dairy milk.
10. Give etiology, diagnosis, and prognosis of meningitis in a child.

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OTOLOGY.

1. What is Politzer's method of inflating the tympanum, and how is it accomplished?
2. Define tinnitus aurium, and give the cause of it.
3. Give etiology, symptoms, and diagnosis of acute otitis media.
4. What is the pyramid of light, and where would you expect to find it?
5. Give symptoms, etiology, and probable serious results of mastoiditis.

BACTERIOLOGY.

1. Tell in detail (a) how you would detect malarial organisms in blood, (b) how distinguish between the quartan and estivoautumnal parasite.
2. Describe (a) Widal's test for typhoid fever; (b) what is its diagnostic value?
3. Differentiate between the culture of *Bacillus typhosus* and that of the *Bacillus coli communis*.
4. How would you examine a suspected specimen of sputum for tubercle bacilli? Give details.
5. Define (a) toxins, (b) antitoxins, (c) amboceptors, (d) bacterioproteins, (e) lysins.
6. Give the morphology of the tetanus bacillus; what are its toxins?
7. Tell in detail how to examine a suspected urethral discharge for gonococci.
8. Discuss Ehrlich's side-chain theory of immunity.
9. Differentiate between the pneumococcus and Pfeiffer's bacillus of influenza.
10. What is phagocytosis? What is accomplished by it?

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

STATE BOARD OF HEALTH OF KENTUCKY.

ANATOMY.

3. The structures to be divided in operating for strangulation of an oblique inguinal hernia are: Skin, superficial fascia, intercolumnar fascia, Cremaster muscle and fascia, infundibuliform fascia, subserous areolar tissue, and peritoneum.
4. Differences between the fourth cervical vertebra and the fourth dorsal vertebra: *The fourth cervical vertebra* has a small, transversely elongated body, with no facets for ribs; the laminae are long and slender; the spinous process is short, nearly horizontal, and bifid; the transverse processes are short and contain a foramen for the vertebral

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artery; the superior articular process is directed upward and slightly backward; the inferior articular process is directed downward and slightly forward; the spinal foramen is large and triangular.

The fourth dorsal vertebra has a heart-shaped body with a facet on each side for articulation with a rib; the laminae are broad and deep; the spinous process is long and points downward; the transverse processes are long, articulate with the tubercle of a rib, and do not contain a foramen; the superior articular process is directed backward and slightly outward; the inferior articular process is directed forward and slightly inward; the spinal foramen is smaller and circular.

5. The axilla is bounded: *Anteriorly*, by the clavicle, Subclavius, Pectoralis major, costocoracoid membrane, Pectoralis minor; *posteriorly*, by the Subscapularis, Teres major, and Latissimus dorsi; *internally*, by the first four ribs, first three Intercostal muscles, Serratus magnus; *externally*, by the humerus, Coracobrachialis, and Biceps.

"*Contents*: The axillary vessels and brachial plexus of nerves, with their branches, some branches of the intercostal nerves, and a large number of lymphatic glands, all connected together by a quantity of fat and loose areolar tissue. *Their position*: The axillary artery and vein, with the brachial plexus of nerves, extend obliquely along the outer boundary of the axillary space, from its apex to its base, and are placed much nearer the anterior than the posterior wall, the vein lying to the inner or thoracic side of the artery and partially concealing it. At the fore part of the axillary space, in contact with the pectoral muscles, are the thoracic branches of the axillary artery, and along the anterior margin of the axilla the long thoracic artery extends to the side of the chest. At the back part, in contact with the lower margin of the subscapularis muscle, are the subscapular vessels and nerves; winding around the lower border of this muscle is the dorsalis scapulae artery and veins; and toward the outer extremity of the muscle the posterior circumflex vessels and the circumflex nerve are seen curving backward to the shoulder.

"Along the inner or thoracic side . . . are some important nerves, viz., the posterior thoracic or external respiratory nerve, descending on the surface of the serratus magnus, to which it is distributed; and perforating the upper and anterior part of this wall, the intercostohumeral nerve or nerves, passing across the axilla to the inner side of the arm." (Gray's *Anatomy*.)

6. In a cross section of the thigh, at the junction of the middle and lower thirds there are severed: *Muscles*, Vastus internus, Rectus femoris, Crureus, Vastus externus, Bi-

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ceps, Semitendinosus, Semimembranosus, Gracilis, Sartorius, Adductor magnus; Nerves, sciatic, long saphenous; Arteries, superficial femoral, anastomotic, deep femoral, perforating.

8. Scarpa's triangle is a triangular area or depression situated just below the fold of the groin. It is bounded *above* by Poupart's ligament, *externally* by the Sartorius, and *internally* by the inner margin of the Adductor longus; its *apex* is formed by the junction of the Adductor longus and Sartorius. The *floor* is formed, from without inward, by the Iliacus, Psoas, Pectineus, Adductor brevis, and Adductor longus. *Contents*: The femoral vessels pass from about the center of the base to the apex, the artery being on the outer side of the vein; the artery gives off the superficial and profunda branches, and the vein receives the deep femoral and internal saphenous; the anterior crural nerve lies to the outer side of the femoral artery; the external cutaneous nerve is still further external, lying in the outer corner of the space; just to the outer side of the femoral artery, and in the sheath with it, is the crural branch of the genitocrural nerve. At the apex, the vein (which at the base was internal to the artery) lies behind the artery. The triangle also contains fat and lymphatics.

SURGERY.

I. VARIETIES OF HERNIA: Hernia may be classified.
I. Anatomically:

- | | | | | |
|-------------|---|--------------|---|---|
| 1. Inguinal | { | Oblique | { | Acquired
Congenital
Infantile or encysted |
| | | Direct | { | External
Internal |
| | | Interstitial | { | Intraparietal
Interparietal
Extraparietal |
| | | | | [Incomplete, or Bubonocoele.] |

2. Femoral

- | | | |
|--------------|---|---------------------------------------|
| 3. Umbilical | { | Congenital
Of infants
Of adults |
|--------------|---|---------------------------------------|

4. Ventral. 5. Lumbar. 6. Obturator. 7. Diaphragmatic.
8. Pudendal, etc.

II. Clinically: Reducible irreducible, obstructed or incarcerated, inflamed, and strangulated.

2. (a) Fractures are variously classified:

I. Simple, compound, and complicated.

II. Complete (transverse, oblique, spiral, longitudinal) and incomplete (fissured, greenstick).

III. Single, and multiple.

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IV. Comminuted, impacted, etc.

V. Intra- and extra-articular; intra- and extracapsular.

In fracture of the neck of the femur, the head of the femur will be found in the acetabulum; in dislocation, the acetabulum will be empty, and the head of the femur will be found elsewhere, *e.g.* on the dorsum of the ilium. In the fracture, crepitus may be elicited; in the dislocation, never. In the dislocation, there is inversion and a fixed position of the limb, both of which are absent in fracture.

3. The diagnosis of gonorrhea is made by finding gonococci within the leucocytes in a urethral discharge. For details, see below—BACTERIOLOGY, Number 7.

7. A limb may be said to be injured beyond hope in a crushing accident: (1) When it is pulped; (2) when the main artery or vein or both are severed and the collateral circulation is also interfered with; (3) when very extensive cellulitis or gangrene appears within a short time of the accident; (4) when there is extensive laceration of tissues and extensive comminution of the bone.

8. *The indications for appendectomy* vary according to the views of the surgeon. Some maintain that every case of appendicitis should be operated on as soon as the diagnosis is made. Others would operate only in case of rupture, or when suppuration occurs, or in cases which do not improve in a week or so, or in cases which are steadily getting worse. Probably all would agree in taking out every appendix that has undergone more than one mild attack.

10. The following contraindications for ether and chloroform are from Hare's *Practical Therapeutics*: "Ether should not be used by inhalation in bronchitis or acute nephritis, because of its irritant properties; in peritonitis or gastritis, because it is apt to induce vomiting; in aneurysm or in the presence of marked vascular atheroma, because it may rupture a blood-vessel by raising arterial pressure; nor in diabetes, lest it produce diabetic coma; and if anemia is present and an examination of the blood shows that the hemoglobin is below 50 per cent., the use of the drug should be avoided if possible.

"Chloroform is not to be used in cases of fatty heart or dilatation of the heart, in those with a known idiosyncrasy, nor in the so-called lymphatic persons with overgrowth of lymphoid tissues, as, for example, adenoids. In the latter case it is particularly apt to cause sudden death. In valvular disease of the heart chloroform may be used with caution, although ether is preferable. Given a case of valvular disease that must be subjected to operation, the chances are bettered with an anesthetic than without it, as the pain and mental shock are worse for the heart than is the anesthetic."

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MEDICAL JURISPRUDENCE.

1. In expert testimony the witness may give his *opinion* on facts or supposed facts as noted by himself or asserted by others. *Theoretically*, this can only be done by those perfectly familiar with the subject in question; but *practically* any (or almost any) physician with a license to practise is accepted as an expert witness.

3. (a) A wound inflicted by a blunt instrument will have somewhat of the appearance of a contused wound; the edges will not be so clean cut, and the surrounding tissues will be more or less bruised.

(b) A wound inflicted during life is generally characterized by hemorrhage, coagulation of the blood, eversion of the edges, and retraction of its sides. It may also be inferred that the wound was inflicted during life if any of the following are noticed: The presence of inflammation, swelling, pus or gangrene on the edges of the wound, or if there is any sign of beginning cicatrization.

4. "Idiocy differs from other states of insanity in the fact that it is marked by a congenital deficiency of the mental faculties. There is not here a perversion or a loss of what has once been acquired, but a state in which, from defective structure of the brain, the individual has never been able to acquire any degree of intellectual power to fit him for his social position. It commences with life and continues through it." (Taylor's *Medical Jurisprudence*.)

OPHTHALMOLOGY.

I.—

	GLAUCOMA.	IRITIS.
Age	Over forty.	Any.
Tension	Plus.	Normal.
Secretion	None, or watery.	None, or watery.
Congestion	General, especially scleral.	General, especially circumcorneal.
Cornea	Cloudy and steamy surface.	Cloudy.
Anterior chamber..	Shallow.	Unchanged.
Iris	Discolored.	Discolored.
Pupil	Dilated, oval.	Contracted, syn- echiæ.
Pain	Severe, contin- uous.	Especially at night.
Vision	Much reduced.	Somewhat re- duced.
Treatment	Eserine, pilocar- pine, iridectomy.	Atropine.

(From Alling and Griffin's *Diseases of the Eye and Ear*.)

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3. Ophthalmia neonatorum is an infectious, purulent inflammation of the conjunctiva in the newborn, due to the gonococcus or other pyogenic germ; produced by contact of the eye with the vaginal secretion of the mother during labor, or infected fingers, or instruments, etc. The probable results of a badly managed case are: Ulceration and sloughing of the cornea, perforation of the anterior chamber, and blindness.

PHYSIOLOGY.

I. (a) Foods are classified as follows:

- | | | |
|--------------|---|--|
| I. Inorganic | { | Water.
Salts. |
| II. Organic | { | Non-nitrogenous { Carbohydrates.
Fats.
Nitrogenous—Proteids. |

(b) Carbohydrates are acted on by ptyalin and amylpsin, fats by steapsin, and proteids by pepsin and trypsin.

The constituents of the bile may be shown in the following table, which presents the averages of three analyses given by Hammarsten; the results are given in parts per thousand:

Water	971.380
Solids	28.620
Mucin and pigments	4.910
Bile salts	12.197
Taurocholate	2.431
Glycocholate	9.766
Fatty acids from soaps	1.200
Cholesterin	1.243
Lecithin and fats	0.970
Soluble salts	7.360
Insoluble salts	0.317

The functions of the bile are: (1) To assist in the emulsification and saponification of fats; (2) to aid in the absorption of fats; (3) to stimulate the cells of the intestine to increased secretory activity, and so promote peristalsis; and at the same time tend to keep the feces moist; (4) to eliminate waste products of metabolism, such as lecithin and cholesterin; (5) it has a slight action in converting starch into sugar; (6) it neutralizes the acid chyme from the stomach, and thus inhibits peptic digestion; (7) it has a very feeble antiseptic action.

4. The circulation of the blood is regulated in (a) *the arteries* by: (1) The elasticity and tone of the arteries, (2) the force and frequency of the cardiac contractions, (3) the resistance in the capillaries; (b) in the *capillaries* it is

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regulated by (1) the action of the heart, (2) the action of the arteries; (c) in the *veins* it is regulated by (1) the action of the heart, (2) aspiration of the thorax, (3) the contraction of the muscles, and (4) slightly by the valves in the veins.

7. "The sympathetic nervous system consists of (1) a series of ganglia connected together by a great ganglionic cord, the gangliated cord, extending from the base of the skull to the coccyx, one gangliated cord on each side of the middle line of the body, partly in front and partly on each side of the vertebral column; (2) of three great gangliated plexuses or aggregations of nerves and ganglia, situated in front of the spine in the thoracic, abdominal, and pelvic cavities respectively; (3) of smaller or terminal ganglia, situated in relation with the abdominal viscera; and (4) of numerous fibers." (Gray's *Anatomy*.)

Its *functions*: "It may safely be said that the sympathetic system has, to a great extent, a controlling influence over the secretion of most of the glands, the lacrymal, the salivary, the sweat glands, the glands of the stomach and intestines, the liver, the kidney, etc.; that it presides over the circulation by regulating the caliber of the blood-vessels and the action of the heart; that it influences respiration; and, finally, that all involuntary muscles, those of the digestive apparatus, of the genitourinary system, of the hair follicles (pilomotor nerves), are under its control to such extent that, for instance, in certain mammals the bladder still continues to fulfill its function for weeks after all the cerebrospinal motor nerves leading to it have been severed. In short, we find that all vegetative life of the organism is, to a greater or less extent, under the control of the sympathetic system. Therefore it may properly be called the vegetative nerve system *par excellence*." (*Reference Handbook of the Medical Sciences*.)

8. The *functions of the skin* are: Protection, excretion, secretion, regulation of the body temperature, absorption, sensation, special sense of touch, respiration.

OBSTETRICS AND GYNECOLOGY.

1. By *presentation* is meant the part of the fetus which presents at the pelvic brim; examples—vertex, breech, face.

By *position* is meant the relation between a point on the fetus and a point on the maternal pelvis; examples—in a vertex presentation the position may be (1) left occipito-anterior, (2) right occipito-posterior, (3) right occipito-anterior, (4) left occipito-posterior.

5. (a) Placenta prævia, or premature separation of a normally situated placenta.

7. "When extrauterine pregnancy exists there are: (1)

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The general and reflex symptoms of pregnancy; they have often come on after an uncertain period of sterility. Nausea and vomiting appear aggravated. (2) Then comes a disordered menstruation, especially metrorrhagia, accompanied with gushes of blood, and with pelvic pain coincident with the above symptoms of pregnancy. Pains are often very severe, with marked tenderness within the pelvis. Such symptoms are highly suggestive. (3) There is the presence of a pelvic tumor characterized as a tense cyst, sensitive to the touch, actively pulsating. This tumor has a steady and progressive growth. In the first two months it has the size of a pigeon's egg; in the third month it has the size of a hen's egg; in the fourth month it has the size of two fists. (4) The os uteri is patulous; the uterus is displaced, but is slightly enlarged and empty. (5) Symptoms No. 2 may be absent until the end of the third month, when suddenly they become severe, with spasmodic pains, followed by the general symptoms of collapse. (6) Expulsion of the decidua, in part or whole. Nos. 1 and 2 are *presumptive signs*; Nos. 3 and 4 are *probable signs*; Nos. 5 and 6 are *positive signs*." (*American Text-Book of Obstetrics*.)

10. (a) Two indications for hysterectomy: Carcinoma and fibroids.

(b) As to preference between the vaginal and abdominal routes, the following is taken from Garrigues' *Gynecology*: "If the vaginal route is available, it should be preferred, because it entails much less shock, requires a simple after-treatment, does not leave any visible cicatrix, predisposes less to hernia, and allows the patient to resume work in shorter time. On the other hand, the vaginal route is more difficult on account of the limited space. Hemorrhage is more troublesome to check, adhesions are harder to separate, and the bladder and intestine more exposed to injury and less accessible for repair. The pelvic cavity cannot be seen so well and the abdominal not at all. If tissue is left to mortify, it emits an offensive odor."

CHEMISTRY.

1. (a) An *atom* is the smallest portion of an element that can enter into a chemical reaction, or that can enter into the composition of a molecule.

(b) A *molecule* is the smallest quantity of any substance that can exist in a free state.

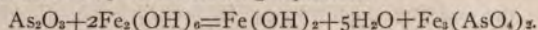
(c) *Isomeric compounds* are compounds which, while differing in properties, possess the same percentage composition.

2. (a) The *symptoms of acute arsenical poisoning*: "In acute cases the symptoms usually begin in from twenty

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to forty-five minutes. Nausea and faintness. Violent, burning pain in the stomach, which becomes more and more intense, and increases on pressure. Persisting and distressing vomiting of matters, sometimes brown or gray, or streaked with blood, or green (Paris green). Purging. More or less severe cramps in the lower extremities." (Witthaus' *Essentials of Chemistry*.)

(b) The chemical antidote is freshly prepared ferric hydroxide. The ferric hydroxide changes the arsenic into ferrous arsenate, which is nonpoisonous. The reaction is represented by the following equation:



(c) *Test for arsenic*: Reinsch's test is as follows: To the suspected fluid add a little pure HCl; suspend in the fluid a small strip of bright copper foil, and boil. If a deposit forms on the copper, remove the copper, wash it with pure water, dry on filter paper, but be careful not to rub off the deposit. Coil up the copper, and put it into a clean, dry glass tube, open at both ends, and apply heat at the part where the copper is. If arsenic is present there will appear in the cold part of the tube a mirror, which will be found on microscopical examination to consist of octahedral crystals of arsenic trioxide.

3. Method for the *quantitative estimation of sugar in urine*: "*Fehling's method*.—The solution is made as follows:

- | | |
|---|-------------|
| I. Dissolve cupric sulphate | 51.98 gm. |
| in water to | 500.00 c.c. |
| II. Dissolve Rochelle salt | 259.9 gm. |
| in sodium hydroxide soln. sp. gr. 1.12 to 1,000 c.c. (Piffard). | |

When required for use, one volume of I. is to be mixed with two volumes of II. The copper contained in 10 c.c. of this mixture is precipitated completely, as cuprous oxid, by 0.05 gm. of glucose.

"To determine the quantity of sugar, place 10 c.c. of the mixed soln. in a flask of about 250 c.c. capacity, dilute with H₂O to about 30 c.c., and heat to boiling. On the other hand, the urine to be tested is diluted and thoroughly mixed with four volumes of H₂O if it be poor in sugar, or with nine volumes of H₂O if highly saccharine, and a burette filled with the mixture. When the Fehling soln. boils, add a few gtt. NH₄HO and then 5 c.c. of the urine from the burette, boil again, and continue the alternate addition of diluted urine and boiling of the mixture until the blue color is quite faint. Now add the diluted urine in quantities of 1 c.c. at a time, boiling after each addition

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until the blue color just disappears. Have ready a small filter, and, having filtered through it a few gtt. of the hot mixture, acidulate the filtrate with acetic acid, and add to it 1 gtt. soln. of potassium ferrocyanide. If a brownish tinge be produced, add another $\frac{1}{2}$ c.c. of dil. urine to the flask, boil, and test with ferrocyanide as before. Continue this proceeding until no brown tinge is produced. The burette reading, taken at this point, gives the number of c.c. of dilute urine containing 0.05 gm. glucose, and this divided by 5 or 10, according as the urine was diluted with 4 or 9 volumes of H_2O , gives the number of c.c. of urine containing 0.05 gm. sugar. The number of c.c. urine passed in twenty-four hours divided by 20 times the number of c.c. containing 0.05 gm. glucose, gives the elimination of glucose in twenty-four hours in grams.

Example. Urine in 24 hours	= 2,436 c.c.
Fehling's soln. used	= 10 c.c.
Urine diluted with 4 vols. H_2O	
Burette reading	= 18.5 c.c.

$$\frac{18.5}{5} = 3.7 = \text{c.c. urine containing 0.05 gm. glucose.}$$

$$\frac{2,436}{3.7 \times 20} = 32.92 = \text{grams glucose eliminated in 24 hours.}''$$
(Witthaus' *Urinalysis*.)

4. Test for bile: Put 3 c.c. HNO_3 in a test tube, add a piece of wood, and heat until the acid is yellow; cool. When cold, float some of the urine to be tested upon the surface of the acid. A green band is formed at the junction of the liquids, which gradually rises, and is succeeded from below by blue, reddish-violet, and yellow.

5. (a) Dairy milk (assuming it to be pure) contains (approximately) 4 per cent. each of proteids, fat, and sugar; whereas in human milk the proteids are about 1 to 2 per cent., the fat about 3 to 4 per cent., and the sugar about 6 to 7 per cent. Dairy milk may be acid in reaction and contains numerous bacteria, whereas human milk is amphoteric or slightly alkaline and generally contains no bacteria.

6. (a) H_2SO_4 is the formula for a molecule of sulphuric acid; (b) BaO_2 for one of barium dioxide; (c) HCl for one of hydrochloric acid; (d) HNO_3 for one of nitric acid. (e) The formula for methyl alcohol is $H.CH_2OH$.

7. (a) Acetphenetidin (or phenacetin) is ethylpara-acetamidophenate.

(b) Hexamethylene-tetramine is urotropin.

(c) The former is prepared by the action of glacial acetic acid upon parphenetidin; the latter by the action of ammonia upon formaldehyde.

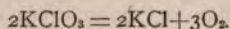
8. (a) Oxygen is a colorless, odorless, tasteless gas,

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slightly soluble in water, heavier than air. It has a strong tendency to combine with other elements, and forms binary compounds with all elements except fluorine and bromine. Oxygen is necessary to the processes of life and combustion.

(b) Its symbol is O; (c) valence, two; (d) atomic weight, 16.

(e) Oxygen may be prepared by heating potassium chlorate.



9. (a) *Specific gravity* is the weight of any substance as compared with the weight of an equal volume of another substance taken as a standard under like conditions of temperature and pressure.

10. The ptyalin of the saliva and the amylpsin of the pancreatic juice act upon boiled starch, and by hydrolysis convert it into soluble starch. By further hydrolytic cleavage, maltose, erythrodextrin, and achroodextrin are formed.

"According to Brown and Heron the reactions may be represented thus:

One molecule of gelatinous starch is converted by the action of an amylolytic ferment into n molecules of soluble starch.

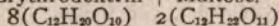
One molecule of soluble starch $= 10(\text{C}_{12}\text{H}_{20}\text{O}_{10}) + 8(\text{H}_2\text{O})$, which is further converted by the ferment into

1. Erythrodextrin + Maltose.



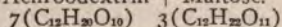
then into

2. Erythrodextrin + Maltose.

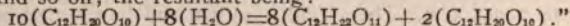


next into

3. Achroodextrin + Maltose.



And so on; the resultant being:



Soluble starch Water Maltose Achroodextrin.

(From Kirkes' *Physiology*.)

NERVOUS DISEASES.

1. *Etiology of migraine*: Heredity, female sex, and age (about the time of puberty) are all predisposing factors; neurotic family history, epilepsy, and hysteria also predispose; overwork at school in conjunction with lowered physical health, eyestrain, injury, shock, fatigue, gout, rheumatism, indigestion, and autotoxemia may all cause migraine.

5. A *delusion* is a belief in something which has no real

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existence, but is purely imaginary; and out of which the person cannot be reasoned. An *illusion* is a false or perverted impression, received through one of the senses. An *hallucination* is the same as an illusion, but without any material basis.

If an individual believes himself to be made of glass, and is afraid of being touched lest he be broken, he is suffering from a *delusion*. If the whistling of the wind is mistaken for a voice telling a person to do a certain thing—that would be an *illusion*. If a person fancied he heard a voice when there was nothing at all to be heard, that would be an *hallucination*.

PRACTICE.

2. *Vertigo* is a disturbance of the sense of equilibrium, a condition in which the patient or objects surrounding him appear to be in a state of rotation or oscillation. It is not a disease; but is a symptom of many pathological conditions.

The chief *varieties* are: (1) Auditory, or labyrinthine, also called Menière's disease; (2) cerebral; (3) gastric; (4) toxic; (5) senile; (6) hysterical; (7) essential.

The *diagnosis* is based on the history of the case, the etiology and the absence of unconsciousness and of convulsive movements. It is to be differentiated from epilepsy, in which the patient is unconscious and also has convulsive movements.

7. *Adenoids* are hypertrophied adenoid tissue in the nasopharynx.

Causes: The real cause is unknown, but the condition is generally observed in childhood; heredity is also supposed to be a factor; males are more frequently affected than females; malnutrition and scrofula seem to be causative factors; the condition is often associated with enlarged tonsils, enlarged cervical glands, hypertrophy of the nasal mucous membrane, deviations of the septum, spurs; it often follows some of the acute infectious diseases.

Symptoms: Mouth-breathing; snoring; open-mouth; a vacant, dull expression of the face; modification of the voice (nasal twang), with inability to pronounce certain letters.

Effects: Earache and other ear affections; mental deficiency; frequent attacks of coryza; nose-bleed; stunted growth; convulsions, laryngismus stridulus, and various other neuroses may also be noticed.

OTOLOGY.

2. *Tinnitus aurium* is the name given to any subjective sounds heard in the ear. The chief causes are: Neuras-

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thenia, impacted cerumen, otitis, and other ear diseases; Menière's disease, obstruction of the Eustachian tube, anemia, leukemia, cerebral hyperemia and anemia, arteriosclerosis, gout, digestive disorders, excessive use of alcohol or tobacco, and the use of certain drugs such as quinine or salicylic acid.

4. The pyramid of light is a reflection of light from the anterior inferior quadrant of the membrana tympani. It is roughly triangular in shape, and its apex touches the tip of the manubrium of the malleus, while its base lies on or near the periphery of the membrana tympani.

BACTERIOLOGY.

2. (a) The Widal test for typhoid fever "depends upon the fact that serum from the blood of one ill with typhoid fever, mixed with a recent culture, will cause the typhoid bacilli to lose their motility and gather in groups, the whole called 'clumping.' Three drops of blood are taken from the well-washed aseptic finger tip or lobe of the ear, and each lies by itself on a sterile slide, passed through a flame and cooled just before use; this slide may be wrapped in cotton and transported for examination at the laboratory. Here one drop is mixed with a large drop of sterile water, to redissolve it. A drop from the summit of this is then mixed with six drops of fresh broth culture of the bacillus (not over twenty-four hours old) on a sterile slide. From this a small drop of mingled culture and blood is placed in the middle of a sterile cover-glass, and this is inverted over a sterile hollow-ground slide and examined. . . . A positive reaction is obtained when all the bacilli present gather in one or two masses or clumps, and cease their rapid movement inside of twenty minutes." (From Thayer's *Pathology*.)

(b) Its diagnostic value is believed by some to be great; others place little reliance on it. It may be absent in cases of typhoid fever; it may be present for several months after an attack of typhoid; the reaction may not be obtained till the third week of the disease; it may be present in other diseases or in perfectly healthy persons. The above have all been urged as objections; certainly only positive results have any value at all.

3. The cultural and microscopic points of difference between the *Bacillus coli communis* and the *Bacillus typhosus* (of Eberth) are:

"(1) The motility of the colon bacillus is, as a rule, not very pronounced, sometimes absent; that of the typhoid bacillus is usually very active.

"(2) On gelatine plates the colon bacillus develops more rapidly and luxuriantly than the typhoid bacillus, and

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on potato it grows more abundantly, being almost always visible.

"(3) The colon bacillus coagulates milk with acid reaction within twenty-four to forty-eight hours; the typhoid bacillus does not coagulate milk.

"(4) The colon bacillus causes fermentation with production of gas in media containing sugar; the typhoid bacillus does not.

"(5) In nutrient agar or gelatine containing lactose and litmus tincture and of a slightly alkaline reaction, the color of the colonies of colon bacillus is pink and the surrounding medium red; while the colonies of typhoid bacillus are blue and there is little or no reddening of the medium.

"(6) The colon bacillus produces indol in cultures of bouillon or peptone; the typhoid bacillus does not.

"(7) When a twenty-four-hour-old bouillon culture of the colon bacillus is mixed with the blood or serum of a patient suffering from genuine typhoid fever, in a dilution of one to ten or more, after the first week of the disease, the Widal reaction is negative; cultures of the typhoid bacillus treated in the same manner and examined in the hanging drop give the characteristic agglutination and clumping of the bacilli." (*Reference Handbook of the Medical Sciences.*)

4. The sputum must be recent, free from particles of food or other foreign matter; select a cheesy-looking nodule and smear it on a slide, making the smear as thin as possible. Then cover it with some carbol-fuchsin, and let it steam over a small flame for about two minutes, care being taken that it does not boil. Wash it thoroughly in water and then decolorize by immersing it in a solution of any dilute mineral acid for about a minute. Then make a contrast stain with solution of Loeffler's methylene blue for about a minute; wash it again and examine with oil immersion lens. The tubercle bacilli will appear as thin red rods, while all other bacteria will appear blue.

5. (a) *Toxins* are the poisonous products of pathogenic bacteria.

(b) *Antitoxins* are substances formed in the body, of a protective character, and capable of rendering inert the poisonous products of bacteria.

(c) *Amboceptors* are antibodies having a double combining affinity; one linking on to the cell to be destroyed, and the other linking on to the alexin or complement.

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STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS OF MARYLAND.

ANATOMY.

1. Describe the frontal bone, including its articulations and sinus.
2. Name the branches and give the relations of the external carotid artery.
3. Give relations of liver. Name lobes of liver.
4. Name structures severed by amputation through middle of leg.
5. Name and locate ventricles of brain.
6. Name the forms of inguinal hernia and give the difference between them.

SURGERY.

1. Give the cause and treatment of external hemorrhoids—(a) palliative, (b) one operative method.
2. What are the indications for operative treatment in any form of hernia?
3. What are the signs and symptoms and what is the surgical treatment of a purulent effusion into the knee joint?
4. Give in detail the treatment of a recent compound fracture of the middle third of the tibia.
5. Give the differential diagnosis between acute inflammation of the middle ear and mastoiditis.
6. Give the evidences and treatment of a wound penetrating the bladder.

PATHOLOGY.

1. Name the organisms most frequently associated with each type of pleurisy and give in detail the method of staining of each organism.
2. Define thrombosis, embolism and infarction, and name the organs in which infarction most frequently occurs.
3. Define sarcoma and carcinoma. Give the various types and the chief avenues of extension of each, and name the sarcomata in the order of their malignancy.
4. Define the term general anasarca and give a gross pathological description of the lesion which usually gives rise to it.
5. Name the varieties of meningitis from a bacteriological standpoint and describe the elements you would expect to find in the fluid from a case of the epidemic variety.
6. Give the gross pathology of amebic dysentery. Describe the organism giving rise to it and name the pathological condition of the liver often associated with it.

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OBSTETRICS AND GYNECOLOGY.

1. Give treatment for case of placenta previa.
2. How would you manage a twin labor, one foot of each child presenting?
3. Diagnosis and treatment of ovarian cyst.
4. How would you treat a case of gonorrheal conjunctivitis in an infant?
5. What treatment would you adopt in a case of umbilical hernia in an infant?
6. How would you manage a posterior shoulder presentation?

PRACTICE.

1. Define (a) myxedema, (b) chlorosis, (c) tinea circinata, (d) enteritis, (e) tabes dorsalis.
2. Differential diagnosis between (a) hysteria and epilepsy, (b) cancer and ulcer of the stomach.
3. Give signs of arteriosclerosis.
4. Give symptoms of Graves' or Basedow's disease.
5. Give differential diagnosis between varicella and varioloid.
6. Give treatment of (a) uremia, (b) empyema, (c) pertussis.

CHEMISTRY.

1. Define the terms dialysis, osmosis, crystalloid and colloid.
2. Give the chemical name for cooking (baking) soda and washing soda, respectively, and state the general properties of each.
3. What, chemically, is glycerine? Give its chemical composition (formula). State its usual source and give its general properties.
4. Give in detail two reliable dissimilar tests for the detection of sugar in the urine.
5. Give the chemical composition (formula) of urea; state the usual amount excreted in 24 hours, and give in detail a reliable method for its quantitative estimation.
6. Give in detail a reliable test for the estimation of the total acidity of a specimen of gastric contents.

MATERIA MEDICA.

1. Name the mineral acids and give the dose of each.
2. What are the preparations of the phosphates and their doses?
3. What are the official preparations and doses of iodine and the iodides?
4. What are the official preparations of ergot and their doses?

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5. Give the official preparations and doses of nux vomica and its alkaloids.

6. What are the principal direct and indirect emmenagogues?

THERAPEUTICS.

1. What are the physiological effects and therapeutic uses of hyoscyamus and its alkaloids?

2. Give the physiological action of nitroglycerine, indications and contraindications for its use.

3. What do we understand by the term alterative, and name the principal drugs of this kind.

4. Describe in detail the treatment for tapeworm.

5. How do disinfectants act? Name the principal ones.

6. Define local and general anesthesia. Name means and method of producing and sources of danger.

PHYSIOLOGY.

1. What portion of the gastrointestinal tract accomplishes the greatest amount of absorption? (b) State what class of substances are absorbed in the stomach, small and large intestines.

2. What are the sources of oxygen and carbonic acid gas in the system? (b) What is the effect of each upon the blood? (c) What is the average quantity of oxygen in venous and arterial blood? (d) What are the symptoms of insufficient oxygen in the blood?

3. Explain the effect of muscular activity upon amount and character of metabolism of body, and the influence upon this metabolism of variation in the composition of the diet.

4. What are ptyalin, pepsin, and pancreatin, and in about what proportion are pepsin and pancreatin found?

5. Describe the condition known as apnea.

6. What becomes of the biliary salts which are constantly poured into the upper part of the intestinal canal? Give test for biliary salts.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS OF MARYLAND.

ANATOMY.

4. The structures severed by amputation through the middle of the leg are: The skin; cutaneous vessels and nerves; aponeurosis; tibialis anticus, extensor longus digitorum, ~~extensor proprius hallucis~~, peroneus brevis, peroneus

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longus, flexor longus hallucis, soleus, gastrocnemius, plantaris, flexor longus digitorum, and tibialis posticus muscles; anterior tibial artery veins and nerve; posterior tibial artery, veins and nerve; peroneal artery and veins; tibia, fibula, and interosseous membrane.

6. The forms of inguinal hernia are:

- (1) *The Direct*, in which the hernia does not occupy the inguinal canal, but leaves the abdomen to the inner side of the deep epigastric artery, through the space known as Hesselbach's triangle. There are two forms of this variety: (a) the hernia may escape between the epigastric artery and the obliterated hypogastric artery; (b) or it may escape between the obliterated hypogastric artery and the outer edge of the rectus muscle.
- (2) *The Indirect or Oblique*, in which the hernia occupies, wholly or in part, the inguinal canal. An *oblique inguinal* hernia may pass into the scrotum or labium majus, when it is called *complete*; or may be retained in the inguinal canal, when it is called *incomplete*, or a *bubonocoele*. Other varieties are the *congenital*, *infantile*, and *encysted*.

SURGERY.

2. The indications for operative treatment in hernia are: In all forms of *femoral* hernia; in *inguinal* hernia when strangulated, irreducible, when a truss is unsatisfactory, or very painful, when obstruction occurs, or when taxis fails; in *umbilical* hernia, in the *infantile* form if persisting till puberty, and in *adults* if strangulated, and in other conditions if the patient is in a suitable condition for operation.

PATHOLOGY.

1. In *acute pleurisy* there may be found the tubercle bacillus, the pneumococcus, and the *Streptococcus pyogenes*; varieties of the *Staphylococcus pyogenes*, the typhoid bacillus, Friedlander's bacillus, and the diphtheria bacillus have also been found in cases of acute pleurisy.

In *purulent pleurisy (empyema)* there may be found the *Streptococcus pyogenes*, pneumococcus, tubercle bacillus. *Staphylococcus pyogenes*, *Micrococcus lanceolatus*.

In *tuberculous pleurisy* the tubercle bacillus may be found.

2. *Thrombosis* is the coagulation of the blood within the vessels during life.

Embolism is the plugging of a blood-vessel by a foreign body.

Infarction is the plugging of a terminal artery. It most

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frequently occurs in the kidneys, spleen, lungs, base of brain, retina, and heart.

3. A *sarcoma* is a malignant tumor of the connective tissue type, in which there is abundant cell formation with very scanty intercellular substance.

Sarcomata are classified:

I. According to the *form of the cell* which predominates, as Round-cell, Spindle-cell, and Mixed-cell Sarcomata.

II. According to the *stroma*, as Myxosarcoma, Chondrosarcoma, Fibrosarcoma, and Osteosarcoma.

III. According to the *secondary changes* which they may undergo, as Liposarcoma, Chloroma, Melanosarcoma, and Calcifying Sarcoma.

Sarcoma extends by the circulation.

The round-celled, the large spindle-celled, and the melanotic sarcomata are the most malignant; the giant-celled and the fibrosarcomata are among the least malignant.

A *carcinoma* is a tumor composed of epithelial cells with a tendency to proliferation and a stroma of connective tissue. The cells are atypical in their appearance, arrangement, division, and proliferation.

Carcinomata are classified as follows: I. Epithelial carcinoma or epithelioma, which may be (a) squamous, (b) cylindrical celled, (c) tubulated; II. glandular carcinoma, which may be (a) scirrhus, (b) encephaloid.

Carcinoma extends as a rule by the lymphatics, occasionally by the blood-vessels.

5. (1) *Cerebrospinal meningitis*, caused by the *Diplococcus intracellularis meningitidis*.

(2) *Tuberculous meningitis*, caused by the tubercle bacillus.

(3) *Pneumococcic meningitis*, caused by the pneumococcus.

(4) *Pyogenic meningitis*, caused by the *Streptococcus pyogenes*, and the *Staphylococcus pyogenes albus* and *aureus*.

(5) A meningitis may be associated with some of the acute infectious diseases; in such cases the typhoid bacillus, the bacillus of diphtheria, or the gonococcus may be present.

The fluid from a case of the epidemic variety might be expected to contain endothelial cells, leucocytes, some fibrinous material, and the *Diplococcus intracellularis meningitidis*, with some of the other bacteria mentioned above.

6. In amebic dysentery the mucosa of the large intestine is edematous and infiltrated, and finally ulcerated. These ulcers have undermined edges, and several of them may coalesce or connect by means of sinuses; the mouth of the ulcer is comparatively small. Much of the mucosa may be necrosed and slough, and the ulceration may ex-

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tend down to the muscular coat or even to the serous coat of the intestine. Occasionally the lower portion of the ileum is involved as well as the large intestine. Perforation is rare.

The condition is due to the *Ameba dysenteriae* or *Ameba coli*, an ameboid body, three or four times as large as a red blood corpuscle, granular in the center and clear at the margin, nucleated, and containing vacuoles, sometimes also containing pigment, bacteria, or other foreign matter.

Abscess of the liver is often associated with this condition.

OBSTETRICS AND GYNECOLOGY.

2. The foot of one child should be pushed up; and the foot of the other child should be pulled down, so as to secure a breech presentation.

3. An ovarian cyst is generally accompanied by menorrhagia or metrorrhagia, sterility, bearing down pain in the pelvis, which may radiate to the back or thighs, hemorrhoids or constipation, frequent micturition, and various other pressure symptoms of the digestive or respiratory apparatus if the cyst becomes sufficiently large. Later on there may be the *facies ovariana*, general impairment of health, and ascites. There are no pathognomonic symptoms. The diagnosis is made by bimanual palpation and (sometimes) exploratory incision. The condition is to be particularly differentiated from pregnancy and ascites.

The treatment is ovariectomy.

4. Treatment of gonorrheal conjunctivitis in an infant. Wash the eyes carefully every half hour with a saturated solution of boric acid; pus must not be allowed to accumulate. Two drops of a two per cent. solution of nitrate of silver must also be dropped on to the cornea every night and morning. The eyes must be covered with a light, cold, wet compress. The patient must be isolated, and all cloths and compresses used must be burnt.

5. Treatment of umbilical hernia in an infant: "A round disk of wood, a coin, or a button is wrapped in lint or some soft material, and kept in position over the umbilicus with a light elastic bandage or with strips of adhesive plaster, these appliances to be removed for cleansing purposes and replaced. Recovery occurs with subsequent closure of the ring. A much more serious form of umbilical hernia rarely occurs, with imperfect development of the abdominal wall, in which large protrusions of intestine and other abdominal organs take place. These require a plastic surgical operation." (King's *Manual of Obstetrics*.)

6. In cases of posterior shoulder presentation, if seen

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before labor, version should be performed to correct the malpresentation; in case of impaction a cesarean section is indicated; sometimes decapitation or embryotomy has been performed, but a cesarean section is preferable. Cases of shoulder presentation have been known to terminate spontaneously, but it is not advisable to rely on this possibility.

PRACTICE.

1. *Myxedema* is a condition characterized by atrophy of the thyroid gland, mental dullness, sluggish movements, and thick speech.

Chlorosis is a form of anemia characterized by a marked diminution in the amount of hemoglobin.

Tinea circinata is ringworm of the body.

Enteritis is a condition characterized by inflammation of the small intestine.

Tabes dorsalis is a condition in which the posterior columns and nerve roots of the spinal cord are degenerated; and which is characterized by incoordination, loss of deep reflexes, and various disturbances of sensation and nutrition.

2. (a) In *epilepsy* there will be a brief aura, sudden and complete loss of consciousness, pupils dilated and rigid, the tongue will be bitten (unless prevented), the sphincters may be relaxed, there may be a slight rise of temperature.

In *hysteria* there may be an aura of considerable duration, the onset is gradual, and consciousness is either retained or only partially lost, the pupils are generally mobile and active, the tongue is not apt to be bitten nor the sphincters relaxed, the temperature is generally normal. Hysteria is apt to be preceded by some emotional disturbance.

(b) *Cancer of the stomach* does not usually occur before forty years of age, is more common in males, the pain is localized and constant, vomiting is copious and occurs some time after eating; the vomitus contains "coffee ground" material; hemorrhages are common; a tumor may be palpated, and examination of the gastric contents shows absence of free HCl and presence of lactic acid; there is progressive emaciation; severe anemia and cachexia are also present.

Ulcer of the stomach is generally caused by injury or bacteria, is most apt to occur between the ages of twenty and forty-five; after eating there is pain localized in the stomach, vomiting occurs soon after eating, hematemesis is common, there is localized tenderness over the stomach, and examination of the gastric contents shows an excess of free HCl.

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3. The *signs of arteriosclerosis* are: A slow pulse of high tension, rigidity of the blood-vessels, enlargement of the left ventricle, displacement of the apex beat to the left, the second sound of the heart is accentuated, harsh, and ringing.

4. In *Graves' or Basedow's disease*, the symptoms are: Rapid pulse, protrusion of the eyeballs, enlargement of the thyroid, and a fine muscular tremor.

5. In *varicella* the symptoms come on gradually; there is no prodromal fever; no pain in the back; the eruption appears on the first day, comes in crops, disappears on stretching the skin, and is not shotty.

In *varioid* the symptoms come on very suddenly; there is fever; severe pain in the back, and headache; the eruption appears on the third or fourth day, as papules, becoming in turn vesicles and pustules.

CHEMISTRY.

1. *Dialysis* is the process of separating substances from a mixture by placing the latter in a vessel with porous walls and immersing it in water, when the more diffusible substance passes through the porous wall. This latter process is called *osmosis*. Substances which readily pass through this porous membrane are called *crystalloids*; those which do not are called *colloids*.

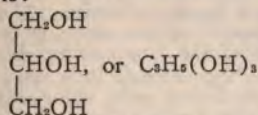
2. Cooking or baking soda is sodium bicarbonate, NaHCO_3 .

Washing soda is sodium carbonate, $\text{Na}_2\text{CO}_3 + 10 \text{ Aq.}$

The former is a white crystalline powder, with a slightly saline taste and a mildly alkaline reaction; it is anhydrous and quite soluble in water.

The latter forms large rhombic crystals, is decidedly alkaline, is efflorescent, and slightly soluble in water.

3. Chemically, glycerine is a triatomic alcohol. Its formula is:



It is usually obtained as a by-product in the manufacture of soaps and of stearin candles.

Its *general properties* are: It is a colorless, odorless, syrupy liquid, with a sweetish taste; it is soluble in water and in alcohol, insoluble in ether and in chloroform; it is not ordinarily volatile; it is a good solvent for several substances.

4. Two reliable dissimilar tests for the detection of sugar in the urine: The urine should first be tested for

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albumin. If this be present, it should be removed by heating the urine to near the boiling point, and filtering from the coagulum.

(1) *Fehling's test*: Place in a test-tube a few c.c. of the liquid prepared as stated below, and boil; no reddish tinge should be observable, even after five minutes' repose. Add the liquid under examination gradually, and boil after each addition. In the presence of sugar a yellow or red precipitate is formed. In the presence of *traces* of glucose, only a small amount of precipitate is produced, which adheres to the glass, and is best seen when the blue liquid is poured out.

[The reagent must be kept in two solutions, which are to be mixed immediately before use. Solution I consists of 34.653 gms. of crystallized CuSO_4 , dissolved in water to 500 c.c.; and Solution II of 130 gms. of Rochelle salt dissolved to 500 c.c. in NaHO solution of sp. gr. 1.12. When required for use equal volumes of the two solutions are mixed, and the mixture diluted with four volumes of water.]

(2) *Boettiger's test*: Render the urine strongly alkaline by addition of Na_2CO_3 . Divide about 6 c.c. of the alkaline liquid in two test-tubes. To one test-tube add a very minute quantity of powdered subnitrate of bismuth, to the other as much powdered litharge. Boil the contents of both tubes. The presence of glucose is indicated by a dark or black color of the bismuth powder, the litharge retaining its natural color. (From Witthaus' *Essentials of Chemistry*.)

5. The formula of urea is $\text{CO}(\text{NH}_2)_2$.

The usual amount excreted in twenty-four hours is from thirty to thirty-five grams, or about an ounce to an ounce and a half.

A comparatively easy test is that of Fowler, based upon the loss of the specific gravity of the urine after the decomposition of the urea by hypochlorite. "To apply this method the specific gravity of the urine is carefully determined, as well as that of the liquor sodæ chlorinatæ (Squibb's). One volume of the urine is then mixed with exactly seven volumes of the liquor sodæ chlorinatæ, and, after the first violence of the reaction has subsided, the mixture is shaken from time to time during an hour, when the decomposition is complete; the specific gravity of the mixture is then determined. As the reaction begins instantaneously when the urine and reagent are mixed, the specific gravity of the mixture must be calculated by adding together once the specific gravity of the urine and seven times the specific gravity of the liquor sodæ chlorinatæ, and dividing the sum by eight. From the quotient so obtained the specific gravity of the mixture after de-

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composition is subtracted; every degree of loss in specific gravity indicates 0.7791 gram of urea in 100 c.c. of urine. The specific gravity determinations must all be made at the same temperature; and that of the mixture only when the evolution of gas has ceased entirely." (Witthaus' *Manual of Chemistry*.)

6. To estimate the total acidity of a specimen of gastric contents: Take 10 c.c. of the unfiltered gastric contents, obtained after a test-meal. Titrate this with a decinormal NaHO solution, using phenol phthalein as an indicator. As each c.c. of the NaHO solution corresponds to 0.00365 grams of HCl, the number of c.c. of the sodium hydroxide solution used, multiplied by 0.0365, gives the percentage of total acidity expressed in terms of HCl.

MATERIA MEDICA.

1. Mineral acids, with their doses: Dilute sulphuric acid, 30 minims; aromatic sulphuric acid, 15 minims; dilute nitric acid, 30 minims; nitrohydrochloric acid, 3 minims; dilute nitrohydrochloric acid, 15 minims; dilute hydrochloric acid, 15 minims; dilute phosphoric acid, 30 minims; sulphurous acid, 30 minims; boric acid, 7 grains.

2. The official preparations of the phosphates and their doses are: Codeine phosphate, one-half to two grains; soluble phosphate of iron, two to five grains; soluble pyrophosphate of iron, two to five grains; syrup of the phosphates of iron, quinine, and strychnine, one dram; elixir of the phosphates of iron, quinine, and strychnine, one dram; sodium phosphate, one-half to two drams; effervescing sodium phosphate, two to four drams; dried sodium phosphate, one-half to one dram; solution of sodium phosphate, one-half to two drams.

3. The official preparations and doses of iodine and the iodides are: Iodine, one-tenth of a grain; compound solution of iodine, three minims; tincture of iodine, one and a half minims; potassium iodide, seven and a half grains; sodium iodide, seven and a half grains; ammonium iodide, four grains; strontium iodide, seven and a half grains; zinc iodide, one grain; diluted hydriodic acid, fifteen minims; syrup of hydriodic acid, one dram.

4. The official preparations of ergot and their doses are: Ergot, thirty grains; extract of ergot, seven and a half grains; fluid extract of ergot, thirty minims; wine of ergot, two drams.

5. The official preparations and doses of nux vomica and its alkaloids are: Nux vomica, one grain; extract of nux vomica, one-quarter of a grain; fluid extract of nux vomica, one minim; tincture of nux vomica, ten minims; strychnine, one-sixty-fourth of a grain; strychnine sul-

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phate, one-sixty-fourth of a grain; strychnine nitrate, one-sixty-fourth of a grain.

6. The principal *direct emmenagogues* are: Apiol, cantharides, permanganate of potassium, ergot, rue, savine, tansy, pennyroyal, and guaiacum.

The principal *indirect emmenagogues* are: Iron, arsenic, manganese, quinine, strychnine, and aloes.

THERAPEUTICS.

2. *Nitroglycerin* causes a dilatation of the blood-vessels, fullness in the head, giddiness, buzzing in the ear, the heart beat increases in rate and force, arterial tension decreases; it is a cardiac and nerve depressant, respiration is first stimulated and then depressed, it produces frontal headache.

It is *indicated* in angina pectoris, cardiac dyspnea, chronic nephritis, with high tension pulse, vomiting, epilepsy, hic-cough, sea-sickness, asthma, and other spasmodic disorders.

3. An *alterative* is a remedy which, in some way that is not understood, alters the course of morbid conditions.

The principal alteratives are: Arsenic, mercury, iodine, sulphur, cod liver oil, phosphorus, colchicum.

4. The patient should be starved for from twelve to twenty-four hours, and early in the morning should take a capsule containing three or four grains of pelletierine, the active principle of pomegranate; in place of the pelletierine, one-half dram or one dram of the oleoresina aspidii may be given. This is to be followed by a calomel purge and Epsom salts. A rectal injection of salt and water will dislodge any segments of the tapeworm that may remain in the rectum after the purgative action of the calomel and saline.

5. *Disinfectants* act: (1) By destroying the bacteria and their products; (2) by acting as strong oxidizing or reducing agents; (3) by combining with the protoplasm of the bacteria and forming insoluble compounds; (4) by modifying the chemical reaction of the media in which the bacteria live.

The principal ones are: Heat, sulphur dioxide, chlorine, carbolic acid, formaldehyde, mercuric chloride, potassium permanganate, iodine, bromine, zinc chloride, creolin, hydrogen dioxide, chlorinated lime.

6. *Local anesthesia* is the condition in which there is loss of sensibility of the tissues over a limited area, due to the application of certain agents, such as cold, ethylene chloride, ether, cocaine, eucaine, or the infiltration of water, or a solution of salt, or of salt, cocaine, and morphine.

General anesthesia is a condition in which there is un-

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consciousness as well as abolition of sensation; it may be induced by the inhalation of ether, chloroform, nitrous oxide gas, chloride of ethyl, or a combination of certain of these agents.

PHYSIOLOGY.

1. (a) The small intestine is the portion of the gastrointestinal tract from which the greatest amount of absorption takes place.

(b) In the *stomach*, sugars and peptones are absorbed; fats, not at all; water, slightly or not at all; alcohol, readily; salts, slightly.

In the *small intestine*, sugars, proteoses, peptones, fats, water, and salts are all absorbed.

In the *large intestine*, water, salt, sugars, proteids, and fats are all absorbed.

2. (a) The *sources of oxygen* in the system are: (1) The oxygen inhaled in the atmospheric air; (2) the chemical decomposition substances in the body.

The *sources of carbonic acid gas* in the system are: (1) It is formed in the cells of the body; (2) the chemical decomposition or analysis of organic substances in the body.

(b) The *effect of oxygen on the blood* is to enter into loose chemical combination with the hemoglobin of the red corpuscles and to make the blood red in color.

The *effect of carbonic acid gas on the blood* is to enter into combination with sodium in the liquor sanguinis and in small quantities with the red corpuscles; it makes the blood of a purple color.

(c) The average quantity of oxygen in *venous* blood is from eight to twelve volumes in a hundred; in *arterial* blood, about twenty volumes in a hundred.

(d) The *symptoms of insufficient oxygen in the blood* are: The respirations are more frequent, and the inspiratory efforts are particularly vigorous; the dyspnea is severe, and lasts a long time before death ensues; the blood pressure is increased; there are various motor disturbances.

STATE BOARD EXAMINATION QUESTIONS.

MICHIGAN STATE BOARD OF REGISTRATION IN MEDICINE.

ANATOMY.

1. Give origin, course, and branches of the internal maxillary artery.

2. Describe the thorax (of the skeleton) as a whole.

3. Describe the thyroid gland as to (a) size, (b) situa-

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tion, (c) structure, (d) gross relation, (e) blood and nerve supply.

4. Describe the duodenum as to (a) size, (b) situation, (c) structure, (d) relations, (e) blood supply.

5. Trace the second cranial nerve from its origin to its distribution. (b) Describe briefly the structure of the eyeball.

6. Describe the pelvis (as a whole). What variations of form depend on sex, and what on age.

7. Describe the middle fossa of the base of the skull.

8. Describe the spleen under the following heads: (a) size, (b) situation, (c) form, (d) relations, (e) support, (f) blood supply, (g) nerve supply.

9. Describe the thoracic part of the sympathetic cord.

10. Describe the axillary artery, giving its relations, naming and indicating briefly the distribution of its branches.

HISTOLOGY AND EMBRYOLOGY.

1. Describe the structure of a sweat gland.

2. Describe the formation of the blood.

3. Give in detail the method of preparing hemin crystals.

4. Name the different kinds of connective tissue.

5. Describe medullated and nonmedullated nerve fibers.

PHYSIOLOGY.

1. Metabolism: (a) Define and give classification. (b) Discuss the manifestation of cell life.

2. (a) What are the functions of the bile? (b) What is the average quantity secreted daily, and what is the function of the liver other than the secretion of bile.

3. (a) Give location of articulate speech, and (b) mention the various forms of asphasia.

4. What is meant by the "refracting apparatus" of the eye, and what are the most common errors relating thereto?

5. State the three divisions of the organ of hearing and give function of Eustachian tube.

6. What changes take place in the composition of the blood as it passes through the kidneys?

7. What is meant by the term "inhibition"? Describe its mechanism.

8. Mention and give function of some one large system of veins beginning and ending in capillaries.

9. Blood: (a) Trace its course through the heart and lungs, beginning at the right auricle. (b) Describe the changes that take place.

10. What are reflex movements? Give classification and laws governing same.

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CHEMISTRY AND TOXICOLOGY.

1. What is a chemical formula? Give chemical formulae for (a) nitric acid, (b) sulphuric acid, (c) phosphoric acid. Give tests for each.
2. What is ozone; its properties; how recognized; its influence on epidemic diseases? If air, which is rich with ozone, is inhaled, what is the effect on the respiratory organs.
3. What is dextrine? What is starch; how obtained, and by what test can it be recognized?
4. What are ptomaines? Give symptoms and treatment of ptomain poisoning.
5. What chemical tests are used for detecting the presence of organic impurities in water?
6. What are the properties and uses of carbolic acid? How is it made? How would you treat a case of carbolic acid poisoning?
7. What are the properties of arsenic? Of what use is the antiseptic quality of arsenic? What is the antidote for arsenic? How prepared?
8. What are the properties of hydrocyanic acid? Give symptoms and treatment of poisoning by same.
9. How is tartar emetic made? Give formula.
10. Name general properties of alkaloids. What are the principal liquid alkaloids?

BACTERIOLOGY.

1. How would you determine, by bacteriological method, if a specimen of drinking water was pure?
2. Describe the *Bacillus anthracis*.
3. What is a parasite? What is a saprophyte?
4. Define a toxin, and an antitoxin. Explain the theory of disease, and treatment by antitoxins.
5. What are mordants?

PATHOLOGY.

1. Explain metabolism in diabetes.
2. Name the causes of hemorrhage.
3. How are infarcts formed?
4. What is the rôle of the exudate in inflammation?
5. What is pathological regeneration?
6. Describe the formation of a dermoid cyst?
7. Give the pathological anatomy in acute yellow atrophy of the liver.
8. Name the various forms of cancer of the stomach in order of frequency.
9. How are toxins formed, and how destroyed or eliminated from the system?

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10. What changes in the blood-vessels take place in chronic interstitial nephritis?

MEDICAL JURISPRUDENCE.

1. What is the difference between expert and ordinary testimony?
2. How would you determine whether a wound found on a dead body was inflicted before or after death?
3. Define abortion? When is it not a crime?
4. Define insanity from a medicolegal standpoint.
5. In a case of suspected poisoning, give detailed directions for preparing and transferring organs to the chemist for examination. What organs should be sent?

EYE, EAR, NOSE, AND THROAT.

1. Iritis: give diagnosis and treatment.
2. Ophthalmia neonatorum: give cause, symptoms, treatment, and prophylaxis.
3. Acute suppurative otitis media: give diagnosis and treatment.
4. Epistaxis: give causes, and describe in detail its treatment.
5. Edema of the glottis: give etiology, symptoms, and treatment.

OBSTETRICS.

1. Describe the corpus luteum of pregnancy.
2. Describe the relation between ovulation and menstruation.
3. Diagnosis of pregnancy.
4. Extrauterine pregnancy: symptoms, diagnosis, treatment.
5. How would you diagnose a shoulder presentation, and what would be your treatment?

GYNECOLOGY.

1. What is ectopic gestation? Give methods of diagnosis and treatment.
2. Give causes of displacements of uterus, symptoms, and treatment.
3. Describe gonorrhea and its sequelæ in the female.
4. Curette: Give indications for using as a means of diagnosis; method of using; dangers of using.
5. Uterine hemorrhage: causes and treatment of each.

SURGERY.

1. What is an abscess? Give pathology.
2. Define appendicitis, and give method of exact diagnosis.

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3. Give the best treatment for appendicitis in usual cases and in fulminating cases.
4. What is spina bifida? Give cause, pathology, and treatment.
5. Describe the best method for the restoration of the pelvic floor. Give technique.
6. In compound, comminuted fracture of the tibia, describe treatment fully.
7. In a gunshot wound through the head of the humerus, what would be your management? Give technique.
8. How would you treat a septic infection of the knee joint? Describe fully.
9. Give diagnosis of chancre, chancroid, and herpetic ulcer.
10. Describe snakebite, its symptoms, pathology, and treatment.

MATERIA MEDICA AND THERAPEUTICS.

1. Mention some of the temperature depressants; their manner of action and their doses.
2. What is the therapy of ergot? Mention some of its preparations and their doses.
3. Give the physiological action of strychnine and its toxicology.
4. Mention the methods by which medicines may be administered.
5. What is the general rule for calculating doses for children?

PRACTICE OF MEDICINE.

(Including Neurology and Pediatrics.)

1. Describe intracranial pressures: causes, symptoms, and treatment.
2. Differentiate between hysterical paralysis and paralysis from a spinal lesion.
3. Give causes, symptoms, physical diagnosis, and treatment of acute croupous pneumonia.
4. Describe causes, tests, symptoms, and treatment of typhoid fever.
5. Give causes of myocardial insufficiencies.
6. Diagnosis and treatment of pleuritic effusion.
7. Describe acute catarrhal jaundice and treatment.
8. What is vertigo? Give cause and treatment.
9. Differentiate between follicular tonsillitis and diphtheria.
10. Give cause, symptoms, and treatment of enterocolitis in young children.

HYGIENE.

1. Define hygiene.

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2. Tell how you would manage a case of typhoid fever to prevent spread of infection.
3. What lower animals are carriers of diphtheritic poison? How manage cases of diphtheria to prevent spread of contagion?
4. How stamp out typhoid fever?
5. How prevent spread of scarlet fever? Of measles?

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

MICHIGAN STATE BOARD OF REGISTRATION IN MEDICINE.

PHYSIOLOGY.

1. (a) *Metabolism* is the entire series of changes that occur in a cell or organism during the processes of nutrition. It is of two kinds: (1) Assimilative, or constructive (*anabolism*); and (2) destructive (*catabolism*).

(b) The manifestations of cell life are: (1) Irritability, or power of responding to a stimulus; (2) power of movement; (3) power of assimilation; (4) power of growth; (5) power of excretion, and (6) power of reproduction.

2. (a) *The functions of the bile* are: (1) To assist in the emulsification and saponification of fats; (2) to aid in the absorption of fats; (3) to stimulate the cells of the intestine to increased secretory activity, and so promote peristalsis, and at the same time tend to keep the feces moist; (4) to eliminate waste products of metabolism, such as lecithin and cholesterin; (5) it has a slight action in converting starch into sugar; (6) it neutralizes the acid chyme from the stomach and thus inhibits peptic digestion; (7) it has very feeble antiseptic action.

(b) The average quantity of bile secreted in twenty-four hours varies from about 500 c.c. to 900 c.c.

The functions of the liver other than the secretion of bile are: (1) The formation of glycogen, (2) the formation of urea and uric acid, (3) the manufacture of heat, and (4) the conversion of poisonous and harmful into inert material.

3. (a) The center for articulate speech is thought to be located in the third or inferior frontal convolution of the left cerebral hemisphere; this is often called Broca's convolution.

(b) The various forms of aphasia, are: (1) Motor; (2) sensory, which may be (a) visual, (b) auditory; (3) conduction; and (4) mixed.

4. *The refracting apparatus* of the eye consists of: (1) *The refracting surfaces*, viz., the cornea, and the an-

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terior and posterior surfaces of the lens; (2) the *refracting media*, viz., the aqueous humor, the crystalline lens, and the vitreous body. The most common errors relating to refraction, are: hyperopia, myopia, and astigmatism.

5. The three divisions of the organ of hearing are: (1) the external ear; (2) the middle ear, or tympanum; (3) the internal ear, or labyrinth.

The *function of the Eustachian tube*, is to keep the atmospheric pressure within the tympanic cavity the same as that on the outside.

6. As the blood passes through the kidney it loses water, salts, urea, carbon dioxide, and extractives.

7. *Inhibition* is the voluntary restraining of a reflex act, or of the processes which occur in one part of the nervous system by the activity of some other part. "The central nervous system is functionally united into a whole, and the activity of each part affects the activity of every other part, *e.g.*, during the act of swallowing, the pulse beats more quickly because the cardioinhibitory reflexes are diminished; sneezing, respiration, micturition, etc., are checked by strong sensory stimulation. If, while the cortex of the Rolandic area of the brain is being stimulated by a current which would ordinarily produce a movement of certain muscles, a strong stimulus be applied to a sensory nerve, the cortical stimulation is rendered ineffective; actions which are ordinarily reflex become voluntary when attention is directed to them. Such instances of inhibition can be explained by supposing (1) that when impulses are passing through a reflex-path, neighboring paths are blocked; (2) that if the route toward a higher center is open, a part of the afferent impulse passes upward to the higher center (the amount of the impulse so directed depending upon the state of attention of the higher center); whereas, when this ascending route is closed, the whole impulse flows across a reflex-path." (Hill, *Physiologists' Note-Book*.)

8. The portal system of veins begins and ends in capillaries. Its function is to carry to the liver blood loaded with material absorbed from the contents of the stomach and intestines.

9. (b) In its passage through the lungs, the blood in the pulmonary artery: (1) becomes cooled; (2) becomes a brighter red color; (3) gains oxygen (about 10 or 12 volumes); (4) loses carbon dioxide (about 7 volumes).

10. *Reflex movements* are involuntary or unconscious movements, due to suitable stimuli. They depend upon the integrity of the *reflex arc*, which is a complex made up of: (1) A surface capable of receiving an impression; (2) an afferent nerve; (3) a nerve cell capable of receiv-

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ing and also of sending out impulses; (4) an efferent nerve, and (5) a surface capable of responding in some way to the impulse conveyed by the efferent nerve.

Reflexes are classified as: (1) Superficial, (2) deep, and (3) visceral.

CHEMISTRY AND TOXICOLOGY.

1. A chemical formula is a collection of symbols representing a molecule and expressing the number and kind of atoms of which it is composed.

The formula for (a) nitric acid, is HNO_3 ; (b) sulphuric acid, H_2SO_4 ; (c) phosphoric acid, H_3PO_4 .

Test for (a) nitric acid: Neutralize with potassium hydroxide, evaporate to dryness, then moisten with H_2SO_4 , and add a crystal of brucin; a red color appears. (b) Sulphuric acid: Add barium chloride, a white precipitate results, which is insoluble in HNO_3 or HCl . (c) Phosphoric acid: To dilute HNO_3 , add the solution to be tested, and then add a solution of ammonium molybdate; a yellowish precipitate results.

2. Ozone is an allotropic modification of oxygen, in a condition of condensation; thus three molecules are condensed into two molecules of ozone: $3\text{O}_2 = 2\text{O}_3$.

Properties. It is a dark blue liquid, almost opaque, and is not decomposed at the ordinary temperature. It is very slightly soluble in water, is insoluble in solutions of acids and alkalis; and it is a powerful oxidizing agent.

Test: Paper impregnated with fresh tincture of guaiacum, is colored blue by ozone.

Ozone, being an antiseptic and disinfectant agent, may be supposed to have a restraining influence on epidemic diseases.

If air which is rich with ozone, is inhaled, an acute coryza and catarrh of the respiratory mucous membrane will be produced.

3. *Dextrine*, or British gum, is a substance obtained by subjecting starch to a dry heat. It is like gum arabic in appearance, is soluble in water, and in soluble in alcohol.

Starch is a carbohydrate having the empirical formula $\text{C}_6\text{H}_{10}\text{O}_5$; it exists in plants.

Preparation: "It is prepared from roots or seeds by crushing them and placing them upon a sieve or strainer, through which water is flowing. The water mechanically carries the starch through the sieve, leaving the fibrous and cellular substances behind. The water is then allowed to stand, and the starch deposits as a white sediment, from which the water is poured off, and which is finally dried." (Luff and Page's *Chemistry*.)

Test: A solution of free iodine gives, with starch, a

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blue color; this color disappears on warming, and reappears on cooling.

4. *Ptomains* are basic, nitrogenous compounds, produced from protein material by the bacteria which cause putrefaction.

Ptomain poisoning. Symptoms: Chilliness, headache, vertigo, muscular twitchings, hallucinations, imperfect vision, weak and rapid pulse, nausea, vomiting, diarrhea, cyanosis, early dyspnea, often subnormal temperature, and occasionally cutaneous eruptions. The prognosis is guardedly favorable.

Treatment consists in the use of emetics and cathartics, or lavage and rectal irrigation. Morphine may be indicated for the relief of pain, and collapse is to be combated by atropine, strychnine, nitroglycerin, external heat, whiskey, etc. After thorough purging, salol, naphthol, or bismuth may be given.

6. Carbolic acid is a colorless crystalline substance when pure, but it soon assumes a pink color; it has a peculiar odor, and a burning taste. It is soluble in water, alcohol, and ether. It is an antiseptic, a poison, and a corrosive. It is also used in the manufacture of its derivatives which are used in medicine, and as dyes. It is made by heating phenyl iodide and potassium hydroxide at a high temperature: $C_6H_5I + KHO = KI + C_6H_5OH$.

The treatment of carbolic acid poisoning consists in administering white of egg, sodium sulphate, or saccharated lime, followed by lavage. Alcohol is said to be antidotal.

7. *The properties of arsenic:* Arsenic is an element, with atomic weight of 75, molecular weight 300, valence three or five; the molecule contains four atoms. It occurs chiefly in combination in orpiment, realgar, mispickel, or iron pyrites. It is a brittle gray solid with metallic luster, or an amorphous powder; the vapor has an odor of garlic; it is insoluble in water; it unites with nascent hydrogen; it burns in oxygen. It is a good conductor of electricity. It is tarnished by moisture; in dry air it is not altered; heated in air it becomes arsenic trioxide. It combines with most metals, also with chlorine, bromine, iodine, sulphur, and with nascent hydrogen.

The antidote for arsenic is a freshly prepared solution of ferric hydroxide; this may be prepared by keeping the two following solutions in separate bottles, and when needed it is only necessary to mix them and administer: (1) *Liq. ferri tersulphatis*, ℥ij; *aquæ*, ℥vj. (2) *Magnesiaæ*, ℥ij; *aquæ*, ℥viij.

8. *The properties of hydrocyanic acid:* It is a colorless liquid, with a penetrating and characteristic odor; it is rap-

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idly decomposed on exposure to light. It is an extremely powerful and rapidly acting poison.

HYDROCYANIC ACID POISONING. *Symptoms:* "Its action is always rapid. Relatively small doses cause an immediate sense of constriction of the throat, followed in one or two minutes by sense of pressure in the head, vertigo, confusion of intellect, and loss of muscular power. The pulse is quick, the respiration slow and stertorous. Tetanic convulsions and involuntary discharges of urine and feces occur, followed by paralysis. Death follows, in from two hours to two days, from asphyxia. When large doses are taken no subjective symptoms are observed. The patient loses consciousness in less than one minute. There is a short convulsive seizure, usually accompanied by evacuations of feces, after which the patient lies perfectly still, with no sign of life, save an almost imperceptible pulse and infrequent spasmodic respiratory efforts, in which inspiration is short and expiration protracted. Death follows in from five to twenty minutes.

Treatment: "There is no time for administration of antidotes. The patient should be stripped, and cold water dashed upon the head and spine, which are then rubbed dry with warm towels, and the cold douche repeated, after which artificial respiration should be practised. Inhalations of chlorine or ammonia, largely diluted with air, are recommended." (Witthaus' *Essentials of Chemistry*.)

9. Tartar emetic is made by boiling antimony trioxide and acid potassium tartrate, in water, filtering, and allowing to crystallize. $\text{Sb}_2\text{O}_3 + 2\text{KHC}_4\text{H}_4\text{O}_6 = \text{H}_2\text{O} + 2\text{KSbOC}_4\text{H}_4\text{O}_6$.

10. *General properties of alkaloids:* Alkaloids are of two kinds, volatile and fixed. The volatile alkaloids are liquid, readily volatile without decomposition, and consist of C, H, and N. The fixed alkaloids are for the most part solid and crystalline, not, or only partially volatile without decomposition, and consist of C, H, N, and O.

Most of the alkaloids are alkaline in reaction, of a bitter taste, and of white color.

Most of the alkaloids are nearly insoluble in water, but are soluble in alcohol, chloroform, ether, and benzine; their salts are generally soluble in water and alcohol, but insoluble in the other solvents just named. They combine with acids to form salts in the same way that ammonia does.

The principal liquid alkaloids are: Sparteine, nicotine, and coniine.

BACTERIOLOGY.

2. The *Bacillus anthracis* is a large, rod-shaped micro-organism, with slightly thickened ends; it is from 5 to 20

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mikrons in length, and a little more than one mikron in breadth; it has a tendency to form long threads; it is non-motile and nonflagellated; it is erobic, and stains by all the alkaline aniline dyes and by Gram's method.

3. A *Parasite* is an organism which lives upon or within another (living) organism.

A *Saprophyte* is an organism which lives upon dead organic matter.

4. *Toxins* are the products of pathogenic bacteria or of ptomaines or leucomaines, and are actively poisonous.

An *antitoxin* is a substance formed in the body, of a protective character, and capable of rendering inert the poisonous products of bacteria.

5. A *mordant* is a substance used to fix the dyes used in staining tissues and bacteria.

PATHOLOGY.

1. *Metabolism in diabetes*: "The essential fact is the inability of the body to consume carbohydrates for the production of energy. As long as excess of proteid and fatty food is taken and consumed, no disturbance of the general metabolism results; but when digestion fails or the diet is poorly regulated, destruction of the proteids of the body with increased excretion of urea occurs. Emaciation may be prevented for a time by increased consumption of proteid food, but eventually occurs. In the destruction of the proteids of the food and tissues, acids are formed in excess (phosphoric from the phosphorus, sulphuric from the sulphur, beta-oxybutyric and diacetic from the non-nitrogenous part of the albumins), and the condition termed acid-intoxication results. A consequence, and to some extent a measure, of this is the increased excretion of ammonium salts in the urine. The uric acid of the urine is but little increased in diabetes." (Stengel's *Text-Book of Pathology*.)

2. The *causes of hemorrhage*, are: Injury to the vessel wall; disease of the vessel wall; invasion by tumors; removal of support of the vessel; increased blood pressure; certain diseases and conditions, like hemophilia, scurvy, etc.

3. Infarcts are formed by the plugging of an end artery by an embolus.

5. *Pathological regeneration* is the formation of new cells and tissues to replace those that have been destroyed by disease or traumatism. It occurs generally on a large scale, and often the regenerated parts are not perfectly identical with those which they replace.

8. According to Osler, the most common forms of cancer of the stomach, are the cylindrical-celled adenocarcinoma and the encephaloid or medullary carcinoma; next

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in frequency is the scirrhus, and then colloid cancer. Sarcomata are very rare.

10. In chronic interstitial nephritis, the blood-vessels are sclerosed and thickened; the most pronounced changes are in the intima; in the outer coats the connective tissue is increased. Arteriosclerosis is generally present.

MEDICAL JURISPRUDENCE.

1. In *expert* testimony, the witness may give his *opinion* on facts or supposed facts as noted by himself or asserted by others. *Theoretically*, this can be done only by those perfectly familiar with the subject in question; but *practically* any (or almost any) physician with a license to practise is accepted as an expert witness.

In *ordinary* testimony, the witness testifies to *facts* which he has seen, or heard, or with which he has become acquainted by personal observation.

2. A wound inflicted during life is generally characterized by hemorrhage, coagulation of the blood, eversion of the edges, and retraction of its sides. It may also be inferred that the wound was inflicted during life if any of the following are noticed: The presence of inflammation, swelling, pus, or gangrene on the edges of the wound, or if there is any sign of beginning cicatrization.

3. Abortion is the premature expulsion of the product of conception (at any period of gestation), whether ovum, embryo, or fetus. It is not criminal when it is due to natural causes, or when done by a physician, after proper consultation, for sufficient cause. The chief conditions that justify the induction of abortion are: (1) Certain pelvic deformities; (2) placenta prævia; (3) pernicious anemia; (4) toxemia of pregnancy; (5) habitual death of the fetus toward the end of pregnancy; (6) hydatidiform mole; (7) habitually large fetal head.

4. According to Taylor, the term insanity is applied to "those states of disordered mind in which a person loses the power of regulating his actions and conduct according to the ordinary rules of society. In all cases of real insanity the intellect is more or less affected."

5. In case of suspected homicidal poisoning, the following parts of the cadaver should be preserved: "The alimentary canal from the cardia to the middle of the rectum, *unopened*, and the contents enclosed by ligatures at the esophagus, duodenum, and lower end of gut; the liver, including the gall-bladder; one kidney; the spleen; a piece of muscular tissue from the leg; the brain, and any urine which may remain in the bladder. They are to be placed in *clean* and *new* glass jars, closed with glass or cork covers or stoppers. Jars with metallic caps should never

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be used. Tapes or cords should be tied about the jar and cap, to which they should be attached by sealing wax bearing impressions of a seal, in such a manner that access can be had to the interior only after breaking the seals or cutting the tapes or cords. Great care must be exercised that no sealing-wax gets into the jars. Each portion should be placed in a jar by itself." (Witthaus' *Essentials of Chemistry*.)

EYE, EAR, NOSE, AND THROAT.

2. *Ophthalmia neonatorum* is an infectious, purulent inflammation of the conjunctiva in the new-born.

It is due to gonococcus or some other pyogenic germ; and is produced by contact of the eye with the vaginal secretion of the mother during labor, or infected fingers, or instruments, etc.

Symptoms: Swelling and redness of the eyes, the presence of a discharge which soon becomes purulent, the conjunctiva of the lids becomes thickened.

Treatment: Wash the eye carefully every half hour with a saturated solution of boric acid; pus must not be allowed to accumulate. Two drops of a 2 per cent. solution of nitrate of silver must also be dropped on to the cornea every night and morning. The eyes must be covered with a light, cold, wet compress. The patient must be isolated, and all cloths and compresses used must be burnt.

Prophylaxis: Whenever there is a possibility of infection, or in every case, wash the eyelids of the new-born child with clean warm water, and drop on the cornea of each eye one drop of a 1 or 2 per cent. solution of nitrate of silver, immediately after birth.

OBSTETRICS.

2. The relation existing between ovulation and menstruation is not known. The two processes are usually coexistent, but they may be independent of each other. The following theories have been held: (1) Menstruation is dependent upon ovulation; (2) ovulation is dependent upon menstruation; (3) they are independent of each other; (4) they both depend upon some other (at present unknown) cause.

3. *Positive signs of pregnancy:* (1) Hearing the fetal heart sound; (2) active movements of the fetus; (3) ballottement; (4) outlining the fetus in whole or part by palpation; and (5) the umbilical or funic souffle.

Doubtful signs of pregnancy: (1) Progressive enlargement of the uterus; (2) Hegar's sign; (3) Braxton Hick's sign; (4) uterine murmur; (5) cessation of menstruation; (6) changes in the breasts; (7) discoloration of the vagina

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and cervix; (8) pigmentation and striae; (9) morning sickness.

Subjective signs of pregnancy, in the order of their appearance, are: Cessation of menstruation, morning sickness, increased frequency of urination, active fetal movements.

Objective signs of pregnancy, in the order of their appearance, are: Softening of the cervix, changes in the mammary glands, discoloration of the vulva and vagina, pulsation in the vaginal vault, Hegar's sign, active fetal movements, ballotement, palpation of the fetus, intermittent uterine contractions, hearing the fetal heartbeat, rate of growth of the uterine tumor.

4. See below—GYNECOLOGY, Question 1.

GYNECOLOGY.

1. Ectopic gestation is a pregnancy in which the ovum is developed outside of the uterine cavity.

Diagnosis.—"When extrauterine pregnancy exists there are: (1) The general and reflex symptoms of pregnancy; they have often come on after an uncertain period of sterility; nausea and vomiting appear aggravated. (2) Then comes a disordered menstruation, especially metrorrhagia, accompanied with gushes of blood, and with pelvic pain coincident with the above symptoms of pregnancy; pains are often very severe, with marked tenderness within the pelvis; such symptoms are highly suggestive. (3) There is the presence of a pelvic tumor characterized as a tense cyst, sensitive to the touch, actively pulsating; this tumor has a steady and progressive growth. In the first two months it has the size of a pigeon's egg; in the third month it has the size of a hen's egg; in the fourth month it has the size of two fists. (4) The os uteri is patulous; the uterus is displaced, but is slightly enlarged and empty. (5) Symptoms No. 2 may be absent until the end of the third month, when suddenly they become severe, with spasmodic pains, followed by the general symptoms of collapse. (6) Expulsion of the decidua, in part or whole. Nos. 1 and 2 are *presumptive signs*; Nos. 3 and 4 are *probable signs*; Nos. 5 and 6 are *positive signs*." (*American Text-Book of Obstetrics*.)

Treatment consists in the removal of the product of conception by a laparotomy, as soon as the diagnosis is made.

5. The following (from Gould and Pyle's *Cyclopedia of Medicine and Surgery*) is a useful classification of uterine hemorrhages, and also gives the causes of the same:

I. Hemorrhages Complicating Pregnancy, Labor, or the Puerperium:

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A. Hemorrhages of Pregnancy: caused by (1) placenta prævia; (2) premature separation of a normally situated placenta; (3) apoplexy of the decidua or placenta.

B. Hemorrhages of Labor: caused by (1) placenta prævia; (2) premature separation of a normally situated placenta; (3) relaxation of the uterus; (4) laceration of the cervix; (5) rupture or inversion of the uterus.

C. Hemorrhages of the Puerperium: caused by (1) retained secundines; (2) displaced uterus; (3) displaced thrombi; (4) fibroid tumors; (5) hypertrophied decidua; (6) carcinoma.

II. Hemorrhages Occurring in the Non-Pregnant Woman:

A. In Virgins Before the Age of Thirty: caused by (1) uterine congestion, the result of cold or exposure; (2) endometritis; (3) polypi and fibroid tumors.

B. In Married Women Before the Age of Thirty: caused by (1) subinvolution; (2) laceration of the cervix; (3) endometritis; (4) retrodisplacements of the uterus; (5) polypi and fibroid tumors.

C. In Women after the Age of Thirty: caused by carcinoma or sarcoma of the uterus.

SURGERY.

9.

HARD CHANCRE.	SOFT CHANCRE.	HERPETIC ULCER.
First lesion of a constitutional disease, viz., syphilis.	A local disease.	A local neurosis.
Due to syphilitic infection.	Due to contact with secretion from chancreoid.	Due to irritation.
Generally a venereal infection.	Always a venereal infection.	May be non-venereal.
May occur anywhere on the body.	Nearly always on genitals.	Occurs generally on prepuce; may occur anywhere on genitals.
Period of incubation never so short as ten days.	Period of incubation always less than ten days (generally about three).	No incubation period.
Generally single.	Generally multiple.	Multiple vesicles occurring in crops.
Not autoinoculable.	Autoinoculable.	Not autoinoculable.
Secretion slight.	Secretion profuse and purulent.	Secretion little or none.
Slightly or not at all painful.	Generally painful.	Tingling and itching rather than painful.
As a rule only occurs once in any patient.	May reoccur in same patient.	Apt to reoccur.
Buboes are painless and seldom suppurate.	Buboes are painful, and usually suppurate.	Lymphatics seldom involved.

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MATERIA MEDICA AND THERAPEUTICS.

1. The following table (from Potter's *Materia Medica*) gives the chief temperature depressants, with their manner of action: Temperature depression may be done by five different actions working upon two principal lines, viz., by—

- | | | |
|--|---|--|
| (a) <i>Lessening heat production, by</i> | { | (1) diminishing tissue change.
(2) reducing the circulation. |
| (b) <i>Promoting heat loss by</i> | { | (3) dilating cutaneous vessels, thus increasing heat radiation.
(4) promoting perspiration—its evaporation lowering the temperature.
(5) abstracting heat from the body. |

The following list of antipyretics includes a few for each of the above-named actions, to which the numbers refer in each case, viz.:

Quinin, 1.	Aconite, 2.	Antipyrin, 1, 4.
Phenol, 1.	Alcohol, 1, 3.	Antimony, 2, 4.
Salicin, 1.	Nitrous ether, 3, 4.	Cold bath, 5.
Digitalis, 2.	Acetanilid, 1, 4.	Cold drinks, 5.
	Phenacetin, 1, 4.	Wet-pack, 5.

3. **STRYCHNINE.** *Physiological action:* Strychnine is a bitter tonic, stimulates appetite, secretion, and digestion, increases peristalsis, stimulates the vasomotor centers, and so raises arterial tension, and stimulates both accelerator and inhibitory nerves of the heart. All the functions of the spinal cord are exalted by strychnine, reflex, motor, vasomotor, and sensory. Large doses cause dilated pupils, irregular and jerky respiration, increased reflexes.

The *symptoms of poisoning by strychnine* are "a sense of suffocation, thirst, tetanic spasms, usually opisthotonos, sometimes emprostotonos, occasionally vomiting, contraction of the pupils during the spasms, and death, either by asphyxia during a paroxysm, or by exhaustion during a remission. The symptoms appear in from a few minutes to an hour after taking the poison, usually in less than twenty minutes; and death in from five minutes to six hours, usually within two hours."

Treatment: "The convulsions are to be arrested or mitigated by bringing the patient under the influence of chloral or chloroform as rapidly as possible; the stomach is to be

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washed out, and the patient is to be kept as quiet as possible." (Witthaus' *Essentials of Chemistry*.)

4. *Medicine can be administered:* (1) By the mouth; (2) by the rectum; (3) by inhalation; (4) by inunction; (5) hypodermically; (6) by intravenous injection; (7) by fumigation; (8) by cataphoresis.

5. Let x = the age of a patient; then $\frac{x}{x+12}$ = the fraction of the adult dose which the patient should receive. Thus, a patient of four years old should receive $\frac{4}{4+12} = \frac{4}{16} = \frac{1}{4}$ of an adult dose.

HYGIENE.

1. Hygiene is the science and art of all that tends to the maintenance and improvement of health, the prevention or shortening of the duration of diseases, and the prolongation of life.

2. Typhoid fever is preventable. All water for drinking or for washing dishes, etc., and milk should be boiled; no ice should be put in water or other drink or food; flies should be kept out of the house; all discharges from the sick person must be disinfected; all utensils, dishes, etc., used by the patient must be thoroughly cleansed, and boiled every day; soiled linen must be soaked in a disinfectant solution before being washed; after each attendance on a patient, physicians, nurses, and others should wash their hands in a disinfectant; thorough sterilization of all bedding, etc., must be performed after the disease is over.

3. Cats, cows, pigeons, and turkeys are said to be carriers of diphtheritic poison. To prevent the spread of contagion in cases of diphtheria, the patient should be isolated in the mildest attack, physician and nurse should use antiseptics and also a disinfectant gargle after coming in contact with the patient, sputum must be burnt, those in attendance must avoid the spray of the expectoration, the room and fittings must be thoroughly disinfected after the termination of the disease. Prophylactic doses of antitoxin may be administered to those exposed to the disease.

4. See No. 2, above.

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STATE BOARD EXAMINATION QUESTIONS.

MINNESOTA STATE MEDICAL EXAMINING BOARD.

ANATOMY AND HISTOLOGY.

1. Give the histology of a nerve trunk.
2. Describe the origin, relations and distribution of the fifth pair of cranial nerves.
3. Describe the cardiac valves. Between what points on the surface are they situated?
4. Describe the fourth ventricle.
5. Describe the portal vein.
6. Describe the thoracic duct.
7. Describe the azygos veins.
8. Give names and general description of the flexor muscles of the forearm.
9. Describe the pronator muscles.
10. Describe the supinator muscles.

PHYSIOLOGY.

1. Describe the human blood, giving reaction, specific gravity, constituents, etc.
2. Describe the secretion of urine.
3. What is the composition, reaction, and function of the pancreatic juice?
4. Describe the pulmonary circulation and the changes which are produced in the blood by aeration.
5. Describe the secretion of milk, and give the composition of human milk and cow's milk.
6. What are the functions of the skin?
7. Describe the normal heart sounds, give probable reasons for same, and tell where best heard?
8. Enumerate the functions of the spinal cord and its special centers.
9. Explain the physiology of visual accommodation to light and distance.
10. Give the physiology of menstruation.

Note—Credits will be given for all diagrams used in explaining questions.

MATERIA MEDICA AND TOXICOLOGY.

1. Write a model prescription for acute bronchitis, giving reasons for use of each ingredient and explaining each step in the writing of the prescription.
2. (a) What are the symptoms of chronic morphine poisoning? (b) What are the symptoms caused by abrupt withdrawal of the drug? (c) What is the treatment of acute poisoning?
3. (a) From what is acetanilid derived? (b) Explain its effects. (c) Give treatment of acute poisoning.

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4. (a) From what is hyoscine derived? (b) What is the dose of hydrobromide? Its physiological effects? Some of its therapeutic uses?
5. Give rule for dosage for children according to age.
6. Give in parallel columns, the diagnosis between acute ptomaine poisoning and acute poisoning by arsenic?
7. Explain the action of chloroform as an anesthetic and tell how you would administer it and with what precautions.
8. What are the adult doses of and physiological antidotes for Tr. strophanthus, apomorphine (by hypodermic), carbolic acid, and chloral hydrate?
9. Explain the action on the bowels of opium, thymol, and bismuth subnitrate.
10. (a) What is the U. S. Pharmacopœia? (b) What is the National Formulary? (c) What is a fluid extract? (d) What is a chemical antidote?

CHEMISTRY AND URANALYSIS.

1. Define specific gravity; an acid; a base; allotropy; synthesis.
2. (a) Give law of definite proportions. (b) Give tests for iodine, silver, mercury.
3. Give a test for sewage contamination of drinking water. What do you consider a good drinking water?
4. Give fully the clinical significance of alubuminuria. Name the urinary casts and the commonly associated kidney lesions.
5. Give a test for indican. What is its clinical significance?
6. What is the diazo-reaction of Ehrlich and its significance?
7. How do you estimate urea?
8. What is the diagnostic value of tests for organic acids found in stomach contents? Describe a test for lactic acid.
9. What is the normal reaction of cow's milk? Why is it important to determine the reaction before sterilization?
10. Give test for blood. What is the freezing point for blood?

BACTERIOLOGY.

1. In what diseases have the specific microorganisms been recovered from the blood?
2. (a) Give fully the technique of finding the tubercle bacillus in suspected sputum. (b) What is Gram's and Weigert's method of staining? Illustrate its differential value.

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3. Describe the preparation of diphtheria antitoxin. How is its action explained?

4. Describe the morphology of the microorganisms causing tetanus, gonorrhea, spinal meningitis, relapsing fever. Give mode of infection.

5. (a) What is the present status of the bacteriology of scarlet fever, rheumatism, and syphilis? (b) Give morphology and cultural properties of the *Diplococcus pneumoniae*.

PRACTICE OF MEDICINE.

1. Describe lichen planus.

2. Describe a typical case of acute miliary tuberculosis.

3. Define bronchiectasis? Give symptoms and physical signs.

4. Nephrolithiasis. Give symptoms fully. Differentiate from appendicitis.

5. Describe the usual symptoms in the secondary stage of syphilis.

6. Differentiate in parallel columns, gastric ulcer and gastralgia.

7. Hereditary ataxia (Friedreich's disease): Describe symptoms and usual course of disease.

8. Differentiate articular rheumatism and arthritis deformans.

9. Define arteriosclerosis. Give usual causes. With what other diseases is it frequently associated?

10. Hematuria: Give principal causes. How would you determine source of hemorrhage?

SURGERY.

1. (a) Give the surgical definition of "tumor." (b) Classify tumors histologically.

2. (a) Define "wound." (b) Give classification.

3. Give in detail treatment of a punctured wound involving the deep palmar arch.

4. State fully how you would treat a blank cartridge wound of the palm of the hand, and give reason for your plan of treatment.

5. Describe step by step the operation of ligature of the ulnar artery at the wrist, giving linear and muscular guides.

6. (a) Define "fracture." (b) Give general classification of fractures.

7. Pathology, symptoms, and treatment of Pott's fracture.

8. Tracheotomy: Describe operation and after treatment.

9. How would you reach a diagnosis in a case of suspected coxitis?

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10. Describe fully the treatment of strangulated inguinal hernia.

GYNECOLOGY.

1. Give differential diagnosis between ovarian cyst and extrauterine pregnancy.
2. Describe your method of repairing a lacerated cervix.
3. Describe inversion of the uterus, giving symptoms, diagnosis, and treatment.
4. Describe uterine polypus, give symptoms, diagnosis, and treatment.
5. (a) Give two indications for hysterectomy. (b) Your reasons for choosing vaginal or abdominal route.

DISEASES OF CHILDREN.

1. Give etiology, pathology, and diagnosis of rickets.
2. Give symptoms of pertussis and differentiate it from acute bronchitis.
3. What alterations would you make in modified milk to overcome constipation.
4. Give briefly differential diagnosis between epilepsy, convulsions due to intestinal irritation, and uremic convulsions.
5. Give symptoms and treatment of dilatation of the stomach.

OBSTETRICS.

1. Describe fully your management of a case of face presentation.
2. Describe your management of a case of neglected transverse presentation where version fails.
3. In contracted and deformed pelvis, enumerate the different methods to be considered in delivery of child and state your reasons for each.
4. Describe fully your management of prolapse of cord.
5. Give your treatment of different grades of asphyxia in the new born.
6. Describe symptoms and treatment of ectopic pregnancy.
7. Describe caput succedaneum and cephalhematoma and give causes of each.
8. Give indications for podalic version.
9. Give your treatment of puerperal septicemia.
10. Give etiology and treatment of mastitis.

PATHOLOGY.

1. Give pathology of anemia, pernicious anemia, and chlorosis.
2. Describe changes in chronic alcoholism.
3. Pathology of carcinoma of liver.

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4. Give pathological findings in typhoid fever.
5. Describe pathological changes in nephritis.

EYE AND EAR.

1. Differentiate glaucoma and iritis.
2. Describe choked disc and in what diseases we may expect to find it.
3. Define myopia, hypermetropia, astigmatism.
4. How would you treat a discharging ear?
5. Describe otitis media.

MEDICAL JURISPRUDENCE.

1. Describe phenomena and signs of death.
2. How would you distinguish human blood from that of other sources?
3. Describe death by hanging; how would you determine whether penal or suicidal, ante- or post-mortem?
4. What is life insurance and upon what does the premium rate depend?
5. What is the normal duration of pregnancy and what are the most important signs of delivery in the living and in the dead?

PREVENTIVE MEDICINE.

1. What quarantine measures are necessary in a case of (a) smallpox, (b) diphtheria, (c) scarlet fever?
2. Describe in detail how you would manage cases of typhoid for the protection of the community.
3. How are the following diseases transmitted: (a) Diphtheria, (b) yellow fever, (c) typhoid fever?
4. How long would you keep in quarantine a case of (a) scarlet fever, (b) diphtheria, (c) smallpox?
5. Give a simple, practical method of ventilating a dwelling in this climate during the winter season.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

MINNESOTA STATE MEDICAL EXAMINING BOARD.

ANATOMY AND HISTOLOGY.

3. *Relation of the cardiac valves to the chest wall:*
"The aortic valves lie behind the third intercostal space, close to the left side of the sternum. The pulmonary valves lie in front of the aortic behind the junction of the third rib, on the left side, with the sternum. The tricuspid valves lie behind the middle of the sternum, about the level of the fourth costal cartilage. The mitral valves lie

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behind the third intercostal space, about one inch to the left of the sternum." (Holden.)

PHYSIOLOGY.

1. *The physical properties of blood*: Fluid, somewhat viscid, red, specific gravity from 1055 to 1062, alkaline reaction, saltish taste, characteristic odor, variable temperature (average about 100 degrees F.).

The *constituents of the blood* are plasma and corpuscles. The *plasma* consists of water and solids (proteids, extractives, and inorganic salts). The *red corpuscles* consist of water and solids (hemoglobin, proteids, fat, and inorganic salts). The *white corpuscles* consist of water and solids (proteid, leuconuclein, lecithin, histon, etc.).

The *red blood corpuscles* are biconcave discs, about 1-3200 of an inch in diameter; they are nonnucleated, and there are about 4,500,000 or 5,000,000 of them in each cubic millimeter of blood. They are elastic and soft, and their shape is changed by pressure, but is promptly regained on the removal of the pressure. Their color is yellowish. They contain hemoglobin.

Their *function* is to carry oxygen from the lungs to the tissues.

The *white blood cells* are spheroidal masses, varying in size, having no cell wall, and containing one or more nuclei; there are about 7,000 to 10,000 of them in each cubic millimeter of blood. They differ much in appearance, and are divided into (1) small mononuclear leucocytes, or lymphocytes, (2) large mononuclear (3) transitional, (4) polynuclear, or polymorphonuclear, or neutrophile, and (5) eosinophile. They are all more or less granular, particularly the last two varieties named. They are probably formed in the spleen, lymphatic glands, and lymphoid tissues. Their fate is uncertain; it has been asserted that they are converted into red blood cells; they play a part in the formation of fibrin ferment; they are sometimes converted into pus cells. Their functions are (1) to serve as a protection to the body from the incursions of pathogenic microorganisms; (2) they take some part in the process of the coagulation of the blood; (3) they aid in the absorption of fats and peptones from the intestine, and (4) they help to maintain the proper proteid content of the blood plasma.

There are also *platelets*, which are very small, colorless, irregular shaped bodies; they are about one-fourth the diameter of a red corpuscle. Their function is not determined; it is possible that they take some part in the coagulation of the blood. In number they vary from about 200,000 to more than 500,000 in each cubic millimeter of blood.

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Plasm conveys nutriment to the tissues; it holds in solution the carbon dioxide and water which it receives from the tissues, and takes them to be eliminated by the lungs, kidneys, and skin; it also holds in solution urea and other nitrogenous substances that are taken to and excreted by the liver or kidneys.

3. **PANCREATIC JUICE:** *Composition:* Water and solids, the latter consisting of three enzymes (trypsin, amyllopsin, and steapsin), proteid material, soap, fats, lecithin, and inorganic salts (carbonate of sodium, chloride of sodium, and phosphates of sodium, calcium, and magnesium).

The *reaction* is alkaline, due to sodium carbonate.

The *functions*: (1) It changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; (2) it converts starch into maltose; (3) it emulsifies and saponifies fats, and (4) it causes milk to curdle.

6. The *functions of the skin* are: Protection, sense of touch, excretion, regulation of body temperature, absorption, and respiration.

7. The *causes* producing the *first* sound of the heart are not definitely ascertained; the following are supposed to be causatory factors: (1) the vibration and closure of the auriculo-ventricular valves, (2) the muscular sound produced by the contraction of the ventricles, and (3) the cardiac impulse against the chest wall.

The *second* sound is caused by the vibration due to the closure of the semilunar valves.

The first sound is heard best at the apex; the second sound is heard best at the base.

8. The *functions of the spinal cord* are: (1) The conduction of impulses and impressions; (2) as a series of nerve centers.

The *special centers in the spinal cord* are the centers for (1) cilio spinal center, (2) for sphincter of bladder, (3) for sphincter of rectum, (4) for erection, (5) for contraction of uterus, (6) for maintaining tonus of muscles.

9. "*Mechanism of Accommodation.*"—The lens is an elastic structure, and when released from the flattening influence of its suspensory ligament tends to assume a spherical shape. During accommodation the ciliary muscle (especially the circular fibers) contracts, drawing forward the choroid and relaxing the suspensory ligament; this diminishes the tension of the lens capsule and allows the inherent elasticity of the lens to increase its convexity. The change in curvature affects chiefly the anterior surface of the lens. This is Helmholtz's theory and the one usually accepted. Lately Tscherning has advanced a different theory; he maintains that the ciliary muscle in-

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creases the tension of the suspensory ligament during contraction and that this causes peripheral flattening of the lens with bulging anteriorly at its center. The act of accommodation is accompanied by contraction of the pupil, and (in binocular vision) by convergence of the visual lines." (*May's Diseases of the Eye.*)

MATERIA MEDICA AND TOXICOLOGY.

2. (a) *Symptoms of chronic morphine poisoning:* Great mental depression, irresolution, loss of self-control, great longing for the drug, nausea, insomnia, anxiety, melancholia, feeble pulse, diarrhea, muscular cramps, and "lying."

(b) *Symptoms caused by abrupt withdrawal of the drug:* Diarrhea, vomiting, insomnia.

(c) *Treatment of acute morphine poisoning:* "Wash out the stomach with a dilute solution of potassium permanganate, leaving about 500 c.c. in the stomach; and maintain the respiration. In the first or second stage the 'ambulatory treatment' should be adopted to prevent, if possible, the establishment of the third stage. If this stage develop, the main reliance is to be placed in maintaining the respiration by artificial methods, until the poison has been eliminated. Strong coffee, or caffeine, by the mouth or rectum, are of benefit. The same cannot be said of atropin. The urine should be drawn by the catheter." (*Witthaus' Essentials of Chemistry.*)

3. (a) Acetanilid is derived from aniline, by the action on it of glacial acetic acid.

(b) The continuous use of acetanilid may give rise to decrease in the number of red blood cells; the face is livid and covered with perspiration, the respirations become slow and shallow, the pulse soft, compressible, and gradually weaker.

(c) *Treatment:* Stop further administration of the drug, then support the patient by stimulants, warmth and strychnine.

4. (a) Hyoscine is derived from Hyoscyamus.

(b) The dose of the hydrobromide is gr. 1/128.

Its *physiological effects:* it quiets the cerebrum and produces sleep; it may also produce delirium; it also causes loss of reflex action.

It is *used* as a hypnotic, in acute mania, insomnia, hysteria; also in morphine and alcohol habit; it is also used as a sedative mydriatic in plastic iritis.

5. Let x = the age of a patient; then $\frac{x}{x + 12}$ = the fraction of the adult dose which the patient should receive.

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Thus, a patient of four years old should receive

$$\frac{4}{4 + 12} = \frac{4}{16} = \frac{1}{4} \text{ of an adult dose.}$$

6. The following table, from Gould and Pyle's *Cyclopedia of Medicine and Surgery*, gives the diagnosis between Ptomaine Poisoning, and Poisoning by Arsenic:

<i>Ptomaine Poisoning.</i>	<i>Arsenic Poisoning.</i>
1. Onset often from 2 to 24 hours.	1. Onset within half an hour.
2. Results from eating animal (nitrogenous) food.	2. History negative.
3. Nervous symptoms marked (twitching of facial muscles, tingling sensations, dilated pupils, convulsions).	3. Nervous phenomena, as seen in autointoxication, absent.
4. Early dyspnea, cyanosis.	4. Dyspnea comes on late in mineral poisoning.
5. Temperature often sub-normal.	5. Temperature often elevated a degree or two.
6. Dryness of mouth and fauces, often bitter taste.	6. Metallic taste in mouth.
7. Vomitus contains mucus, contents of stomach, or bile.	7. Vomitus variable, often tinged with blood, and containing trace of poison.
8. Generally watery diarrhea, sometimes constipation.	8. Feces may contain blood and trace of poison.
9. Various cutaneous eruptions (scarlatinal eruptions, urticaria).	9. Cutaneous eruptions absent.

8.

	Adult Dose.	Physiological Antidote.
Tr. strophanthus	℥. viij	Nitroglycerin; amyl nitrite
Apomorphine (by hypodermic)	gr. 1/10	None
Carbolic acid	gr. j	Magnesium or sodium sulphate
Chloral hydrate	gr. xv	Strychnine.

9. *Opium* depresses the motor activity of the intestines, prevents peristalsis, and causes constipation.

Thymol is an intestinal antiseptic and disinfectant.

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Bismuth subnitrate has but little effect on the bowels; it is mildly protective, and astringent.

10. (a) *The U. S. Pharmacopœia* is an official list of medicinal substances, with definitions, descriptions, or formulæ for their preparation; it is recognized by the medical profession of the United States, but has no legal authority.

(b) *The National Formulary* is a collection of preparations not contained in the U. S. Pharmacopœia.

(c) *Fluid extracts* are liquid alcoholic preparations of nearly uniform strength; each cubic centimeter of the fluid extract represents one gram of the drug.

(d) *A chemical antidote* is one that changes the chemical character of the poison, and so renders it inert.

CHEMISTRY AND URANALYSIS.

1. *Specific gravity* is the weight of a substance as compared with the weight of a like volume of a given substance, taken as a standard, under similar conditions of temperature and pressure.

An acid is a compound of an electronegative element or radical with hydrogen, part or all of which hydrogen it can part with in exchange for an electropositive element, without the formation of a base.

A base is a ternary compound capable of entering into double decomposition with an acid to produce a salt and water.

Allotropy is the property possessed by some elements (such as oxygen, sulphur, phosphorus) of appearing under different forms in which their general chemical characters are unchanged, but their physical properties vary.

Synthesis is the formation of compounds from elements or from simpler compounds.

2. (a) *The law of definite proportions*: The same compound always contains the same elements and in the same proportions.

(b) *Test for iodine*: Add starch paste; in the presence of iodine it becomes blue.

Test for silver: Add hydrochloric acid; in the presence of silver a white precipitate is formed which is insoluble in nitric acid, but soluble in ammonium hydroxide.

Test for mercury: The Reinsch test is as follows: To the suspected fluid add a little pure HCl; suspend in the fluid a small strip of bright copper foil, and boil. If a deposit forms on the copper, remove the copper, wash it with pure water, dry on filter paper, but be careful not to rub off the deposit. Coil up the copper, and put it into a clean dry, glass tube, open at both ends, and apply heat at the part where the copper is. If mercury is present

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there will appear in the cold part of the tube a mirror, which will be found on microscopical examination to consist of metallic globules of mercury.

4. (a) *Albumin* is found in the urine: "(1) In fevers, as typhoid and pneumonia. (2) In valvular heart lesions, degeneration of the heart muscles, diseases of the coronary arteries, impeded pulmonary circulation, in pregnancy by pressure upon the renal veins, in intestinal catarrh, and in Asiatic cholera. (3) In purpura, scurvy, leukemia, pernicious anemia, jaundice, diabetes, and syphilis. (4) After taking lead, mercury, iodine, phosphorus, arsenic, antimony, chloroform, cantharides, oxalic, carbolic, salicylic or the mineral acids, turpentine and nitrates. (5) In large amounts in acute nephritis and chronic parenchymatous nephritis; in small amounts in chronic interstitial nephritis and amyloid kidney." (Witthaus' *Essentials of Chemistry*.)

(b) "Casts in the urine occur in nephritis, and different varieties are found in the different forms of that disease. *Hyaline* casts occur in all forms of nephritis, in congestion of the kidneys, in jaundice, and even in health. *Waxy* casts occur especially in chronic parenchymatous nephritis. *Epithelial* casts occur especially in acute parenchymatous nephritis. *Granular* casts are especially common in chronic nephritis, but they may occur in acute nephritis. *Fatty* casts occur chiefly in chronic parenchymatous nephritis. *Blood* casts occur in acute and chronic hemorrhagic nephritis. *Pus* and *bacterial* casts are occasionally met with in suppurative nephritis." (From Stevens' *Practice of Medicine*.)

5. *Test for indican in the urine*: The urine is mixed with one-fifth its volume of 20 per cent. solution of lead acetate and filtered. The filtrate is mixed with an equal volume of fuming hydrochloric acid containing 3:1000 of ferric chlorid, a few drops of chloroform are added, and the mixture strongly shaken one to two minutes. With normal urine the chloroform remains colorless, or almost so; but if an excess of indoxyl compounds be present the chloroform is colored blue, and the depth of the color is a rough indication of the degree of the excess.

Indicanuria is found in hypochlorhydria; in hyperchlorhydria of gastric ulcer; in conditions in which there is diminished peristalsis of the small intestines, as in ileus and peritonitis, not in simple constipation; also in conditions in which putrefactive changes occur in the body elsewhere than in the intestine, as in empyema, putrid bronchitis, gangrene of the lungs, etc. (From Witthaus' *Essentials of Chemistry*.)

6. For the diazo reaction of Ehrlich, two solutions are

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required: (1) A saturated solution of sulphanilic acid in a mixture of 50 c.c. of hydrochloric acid and 950 c.c. of water; and (2) a 0.5 per cent. solution of sodium nitrite.

To make the test, 1 c.c. of (2) is added to 40 c.c. of (1) and the mixture thoroughly shaken. Equal quantities of this mixture and the urine to be tested are shaken together in a test tube, and 1 c.c. of ammonia is then floated upon the surface, when, in an affirmative result, a red band is formed at the junction of the fluids.

Its diagnostic value is uncertain. Von Jaksch "disclaims for this test any clinical importance whatever." Others have claimed that the reaction is pathognomonic of typhoid; but it has been found in other diseases besides typhoid—namely, phthisis, pneumonia, measles, scarlet fever, small-pox, and malaria.

7. A comparatively easy test for *Urea* is that of Fowler, based upon the loss of the specific gravity of the urine after the decomposition of the urea by hypochlorite. "To apply this method the specific gravity of the urine is carefully determined, as well as that of the liquor sodæ chlorinatæ (Squibb's). One volume of the urine is then mixed with exactly seven volumes of the liquor sodæ chlorinatæ, and, after the first violence of the reaction has subsided, the mixture is shaken from time to time during an hour, when the decomposition is complete; the specific gravity of the mixture is then determined. As the reaction begins instantaneously when the urine and reagent are mixed, the specific gravity of the mixture must be calculated by adding together once the specific gravity of the urine and seven times the specific gravity of the liquor sodæ chlorinatæ, and dividing the sum by eight. From the quotient so obtained the specific gravity of the mixture after decomposition is subtracted; every degree of loss in specific gravity indicates 0.7791 gram of urea in 100 c.c. of urine. The specific gravity determinations must all be made at the same temperature; and that of the mixture only when the evolution of gas has ceased entirely." (Witthaus' *Manual of Chemistry*.)

8. The presence in the stomach contents, after a test meal, of considerable quantities of organic acids is supposed to be pathological. Lactic acid, particularly, is supposed to be diagnostic of cancer of the stomach. Organic acids, as a rule, denote pyloric stenosis, gastric dilatation, or deficient motor power of the stomach.

"The presence of lactic acid is detected by *Uffelmann's reagent*, which consists of a solution of Fe_2Cl_6 and phenol, diluted to an amethyst-blue color, which is changed to yellow by lactic acid. In order to avoid error by the action of other substances which have a like action upon

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the reagent, 10 c.c. of the filtered gastric contents are agitated with ether, and the ethereal extract separated and agitated with the reagent; or it may be evaporated, the residue dissolved in water, and the solution added to the reagent." (Witthaus' *Manual of Chemistry*.)

10. *Test for blood*: Let some of the stained material soak thoroughly in a very small quantity of saturated solution of sodium chloride. Put a few drops of the fluid on a slide, cover with a cover-glass, let evaporation occur, allow a drop of glacial acetic acid to enter from the side, and gently warm. On cooling, hæmin crystals form, and can be seen under the microscope.

The freezing point for blood is given as 0.56° .

BACTERIOLOGY.

1. The specific microorganisms have been recovered from the blood, in the following diseases: Typhoid, relapsing fever, cerebrospinal meningitis, malaria, diphtheria, erysipelas, influenza, tuberculosis, cholera, anthrax, pneumonia, syphilis (?), leprosy, bubonic plague, gonorrhœa, tetanus.

2. (a) To demonstrate the existence of *tubercle bacilli* in the sputum: The sputum must be recent, free from particles of food or other foreign matter; select a cheesy-looking nodule and smear it on a slide, making the smear as thin as possible. Then cover it with some carbol-fuchsin, and let it steam over a small flame for about two minutes, care being taken that it does not boil. Wash it thoroughly in water and then decolorize by immersing it in a solution of any dilute mineral acid for about a minute. Then make a contrast stain with solution of Loeffler's methylene blue for about a minute; wash it again and examine with oil immersion lens. The tubercle bacilli will appear as thin red rods, while all other bacteria will appear blue.

PRACTICE OF MEDICINE.

9. *Arteriosclerosis* is a condition in which the walls of an artery, especially the intima, become hard, dry, and thickened.

Usual causes: Syphilis, alcoholism, gout, Bright's disease, overeating, and excessive muscular exertion. It is most liable to occur in old age.

It is frequently associated with: Chronic interstitial nephritis, chronic myocarditis, paralysis, and gangrene.

10. The principal causes of *hematuria* are: (1) Conditions in which the blood is affected, as in the infectious diseases, in scurvy, pernicious anemia, and purpura; (2) traumatism or inflammations in any part of the urinary

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tract; (3) congestion of the kidneys secondary to disease of the lungs, heart, or liver.

In *renal* hematuria the blood and urine are intimately mixed, tube casts are apt to be present, and there may be renal colic or pain in the lumbar region. In *vesical* hematuria the blood and urine are not so well mixed, and pure blood is apt to be passed at the end of urination. In *urethral hematuria* the urine first passed is bloody.

SURGERY.

4. After a blank-cartridge wound of the palm of the hand, the patient should be anesthetised, hemorrhage checked, dead tissue and any foreign matter should be removed, the wound thoroughly disinfected and drained, and it might be well to administer at once a prophylactic dose of antitetanic serum.

GYNECOLOGY.

1. In *extrauterine pregnancy*, see below—OBSTETRICS, Question 6.

In the *ovarian cyst*: The history must be taken very carefully, and there will be found absence of the chief signs of pregnancy; there may be the characteristic facies; and the tumor is soft and fluctuating.

5. (a) Two indications for *hysterectomy*: Carcinoma and fibroids.

(b) As to preference between the vaginal and abdominal routes, the following is taken from Garrigues' *Gynecology*: "If the vaginal route is available, it should be preferred, because it entails much less shock, requires a simple after-treatment, does not leave any visible cicatrix, predisposes less to hernia, and allows the patient to resume work in shorter time. On the other hand, the vaginal route is more difficult on account of the limited space. Hemorrhage is more troublesome to check, adhesions are harder to separate, and the bladder and intestine more exposed to injury and less accessible for repair. The pelvic cavity cannot be seen so well, and the abdominal not at all. If tissue is left to mortify, it emits an offensive odor."

OBSTETRICS.

2. In contracted and deformed pelvis, the different methods to be considered in delivery of the child are: (1) Induction of premature labor; (2) Forceps; (3) Version; (4) Craniotomy; (5) Cesarean section, or one of its modifications; (6) Symphyseotomy.

So many things have to be taken into consideration that it is quite impossible to lay down any hard and fast rules to govern every case. The following table (from King) is a safe guide:

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When Conjugate Diameter of Brim measures:	The Mode of Delivery at Term is:
Between 4 and $3\frac{1}{2}$ inches...	By Forceps.
Between $3\frac{1}{2}$ and $2\frac{3}{4}$ inches.	{ By Forceps, Version. Symphyseotomy.
Between $2\frac{3}{4}$ and 2 inches...	{ Cesarean section, or Craniotomy, <i>pro re nata</i> . Cesarean section, if child alive.
At 2 inches or less.....	{ Craniotomy, if child dead. Cesarean section always. Craniotomy excluded, whether child dead or alive.

6. *Diagnosis*: "When extrauterine pregnancy exists there are: (1) The general or reflex symptoms of pregnancy; they have often come on after an uncertain period of sterility; nausea and vomiting appear aggravated. (2) Then comes a disordered menstruation, especially metrorrhagia, accompanied with gushes of blood, and with pelvic pain coincident with the above symptoms of pregnancy; pains are often very severe, with marked tenderness within the pelvis; such symptoms are highly suggestive. (3) There is the presence of a pelvic tumor characterized as a tense cyst, sensitive to the touch, actively pulsating; this tumor has a steady and progressive growth. In the first two months it has the size of a pigeon's egg; in the third month it has the size of a hen's egg; in the fourth month it has the size of two fists. (4) The os uteri is patulous; the uterus is displaced, but is slightly enlarged and empty. (5) Symptoms No. 2 may be absent until the end of the third month, when suddenly they become severe, with spasmodic pains, followed by the general symptoms of collapse. (6) Expulsion of the decidua, in part or whole. Nos. 1 and 2 are *presumptive signs*; Nos. 3 and 4 are *probable signs*; Nos. 5 and 6 are *positive signs*." (*American Text-Book of Obstetrics*.)

Treatment consists in removal of the product of conception, by a laparotomy, as soon as the diagnosis is made.

8. *The indications for Podalic Version* are: (1) In transverse presentations; (2) in placenta prævia; (3) in malpresentations of the head; (4) in simple flattened pelvis, and in minor degrees of pelvic contraction; (5) in prolapsed funis; (6) in sudden death of the mother; and (7) in any case where speedy delivery is imperative.

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PATHOLOGY.

1. In *secondary anemia*, the blood would show: (1) A diminution in the number of red corpuscles; (2) a diminution in the amount of hemoglobin, perhaps greater than that of the red corpuscles; (3) poikilocytosis, and variations in the size of the red corpuscles; (4) the presence of a few nucleated red corpuscles; (5) a moderate leucocytosis.

In *pernicious anemia* the blood would show: (1) A diminution in the number of red corpuscles; (2) a relative increase in the amount of hemoglobin; (3) poikilocytosis; (4) the presence of nucleated red cells; (5) variation in the size of the red cells; (6) the leucocytes may be diminished.

The skin is usually discolored (yellowish); fatty degeneration of the heart is common; the liver may be fatty.

In *chlorosis*, the blood shows: (1) A great diminution in the amount of hemoglobin; (2) a slight diminution in the number of red corpuscles; (3) poikilocytosis; (4) occasionally a few nucleated red corpuscles; (5) a very slight leucocytosis.

The skin is generally yellowish-green, and the blood and conjunctiva pale.

EYE AND EAR.

	GLAUCOMA.	IRITIS.
Age.....	Over forty.	Any.
Tension.....	Plus.	Normal.
Congestion.....	General, especially scleral.	General, especially circumcorneal.
Cornea.....	Cloudy and steamy surface.	Cloudy.
Anterior chamber.	Shallow.	Unchanged.
Pupil.....	Dilated, oval.	Contracted, synechia.
Pain.....	Severe, continuous.	Especially at night.
Vision.....	Much reduced.	Somewhat reduced.
Treatment.....	Eserine, pilocarpine iridectomy.	Atropine.

(From Alling and Griffin's *Diseases of the Eye and Ear*.)

2. *Choked disc* is a condition in which the optic papilla is swollen, congested, and inflamed; it is due to increased intracranial pressure.

It occurs in brain tumors, tuberculous meningitis, abscess

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of the brain, syphilis, nephritis, rheumatism, toxic agents (as lead or alcohol), infectious diseases, and anemia.

3. *Myopia* is a condition in which the anteroposterior axis of the eye is abnormally long, and parallel rays are focused in front of the retina.

Hypermetropia is a condition in which the anteroposterior axis of the eye is abnormally short, and parallel rays are focused behind the retina.

Astigmatism is a condition in which owing to a greater curvature of the eye in one meridian than in others, the refractive power of the eye varies.

4. *Treatment of a discharging ear*: Cleanliness and drainage are primary essentials. The discharge may be removed by sterile cotton, and the use of a warm mild antiseptic lotion. A solution of carbolic acid 1:40 may be dropped in and allowed to remain in the ear for a few minutes. Alcohol may be used when granulations appear. Treatment must only be undertaken once or twice a day, at the first; and the intervals gradually lengthened as the discharge becomes less. This must be persevered in for a long time. Paracentesis may be necessary, and later on, in complicated cases, the ossicles may have to be removed.

MEDICAL JURISPRUDENCE.

1. *Phenomena and signs of death*, are: The complete and permanent cessation of circulation and respiration, rigor mortis, loss of body heat, pallor of the body, putrefaction.

2. It is, probably not possible to distinguish absolutely human blood from that of other mammals. By careful measurements of the red corpuscles under the high powers of modern microscopes, human blood can be readily distinguished from that of *some animals*; but in other cases, such as the differential diagnosis between the blood of a man and that of a dog, there is no absolute certainty.

3. A sure sign of *hanging antemortem* is the flow of saliva from the mouth, down the chin, and on to the chest. This could not occur in a case of *hanging postmortem*, as the secretion of saliva is a vital process.

4. *Life insurance* is a contract whereby the company insuring, in consideration of a certain premium payable as arranged, agrees to pay a certain amount at the death of the assured to his heirs or other designated person, or to the insured himself if living at a certain date.

The *premium rate depends on*: The age, physical condition, family history, occupation, residence, personal habits, health, etc., of the applicant.

PREVENTIVE MEDICINE.

2. Typhoid fever is preventible. When the municipal

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authorities do not consider it their duty to supply pure water, each household should boil all water that is to be used for drinking or for washing dishes, etc.; milk should be boiled also; and no ice should be put in water or other drink or food; flies should be kept out of the house as far as possible, by means of screens or otherwise; all discharges from the sick person must be disinfected; all utensils, dishes, etc., used by the patient must be thoroughly cleansed, and boiled every day; soiled linen must be soaked in a disinfectant solution before being washed; after each attendance on a patient, physicians, nurses, and others should wash their hands in a disinfectant; thorough sterilization of all bedding, etc., must be performed after the disease is over.

3. *Diphtheria* is transmitted by contact with those already infected, by fomites, by careless disposal of secretions, by coughing or sneezing whereby the bacilli are carried through the air to the nose or mouth of others.

Yellow fever is transmitted through the bite of an infected mosquito (*Stegomyia fasciata*).

Typhoid fever is transmitted through the food and drink becoming contaminated; flies may aid in this contamination.

4. PERIOD OF QUARANTINE FOR: (a) *Scarlet fever*: till the patient is quite free from sore throat or discharges of any kind, and the desquamation has entirely disappeared; generally six to eight weeks.

(b) *Diphtheria*: till the patient is free from all signs of congestion or rhinitis, and continued bacteriological examination is persistently negative.

(c) *Smallpox*: till all crusts or scabs have entirely disappeared.

STATE BOARD EXAMINATION QUESTIONS.

STATE BOARD OF HEALTH OF MISSOURI.

ANATOMY.

1. Give landmarks for location of the fissure of Sylvius; (b) fissure of Rolando.
2. Give origin, ending, branches, and relation of the brachial artery.
3. Give gross and minute anatomy of the kidney.
4. Describe the diaphragm. Give lines of insertion.
5. Describe the kneejoint.
6. Mention all muscles that flex the leg on the thigh.
7. Describe the os innominatum.
8. Name lobes of brain and their subdivisions.
9. Give all structures divided in amputation of the arm at the middle third.

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10. Give gross and minute anatomy of the urinary bladder.

PHYSIOLOGY.

1. What effect would section of the spinal accessory nerve have on the heart's action?
2. Describe in detail the alimentary canal and give function of each section.
3. To what is acidity of the urine due and what kind of food tends to lessen it?
4. Explain theory of color vision.
5. Give organs and tissues in which white blood corpuscles are formed.
6. Describe the liver and give its function.
7. Describe secretion of sweat; upon what does quantity secreted depend?
8. Give the function of the pancreas and name the ferments secreted by it.
9. Give a brief description of the lymphatic circulation.
10. Give the function of the skin.

CHEMISTRY.

1. Give chemical composition of sweet milk.
2. Give two tests (chemical) for sugar in the urine.
3. What is the effect (chemical) of tannic acid with ferruginous preparations?
4. What are the chemical properties of ethyl alcohol?
5. What is the chemical composition of "lime" or "hard" water?

THERAPEUTICS.

Give doses and indications for use of:

1. Arsenic.
2. Ipecac.
3. Tartar emetic.
4. Caffeine.
5. Heroin.
6. Magnesia sulph.
7. Lobelia.
8. Copaiba.
9. Hydrastis.
10. Ergot.

PATHOLOGY.

1. Discuss exudation and transudation.
2. Describe the changes that take place in Peyer's patches in typhoid fever.
3. Discuss hyperplasia.
4. Discuss pseudomembranous formation.
5. What is degeneration? Name the principal forms.

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PRACTICE.

1. What is Bell's palsy? Give symptoms and treatment.
2. Give etiology, symptoms, and treatment of cerebral apoplexy.
3. How would you differentiate this condition (cerebral apoplexy) from opium poisoning?
4. What is Romberg's sign; Stellwag's sign; and with what diseases are they associated?
5. Give etiology, symptoms, and treatment of Addison's disease.
6. Give etiology, symptoms, and treatment of leukemia.
7. What is a hemophilia? Give a brief discussion.
8. What is a papilloma?
9. Give symptoms and treatment of sunstroke.
10. Give etiology, symptoms, and treatment of cholera infantum.

OBSTETRICS.

1. Give manner of applying forceps and mechanism of the delivery in R. O. A. position.
2. Give history of fecundated ovum from time it leaves ovary to its normal delivery at full term.
3. Describe tubal pregnancy, giving causes, symptoms, diagnosis, and treatment.
4. Describe varicose veins of pregnancy. Give dangers of same. Give treatment.
5. Differentiate puerperal sepsis from malarial infection. Give symptoms and treatment of puerperal sepsis.
6. Describe Credé's method in delivery of the placenta. Give dangers to be avoided in using the same.
7. Describe asphyxia of the newborn, giving causes, symptoms, and treatment.
8. Describe in full the obstetrical preparation of the patient.
9. What is meant by a dry birth? Give management of rigid os uteri in labor.
10. How would you prevent laceration of the perineum in normal delivery? Describe manner in which the same should be repaired.

GYNECOLOGY.

1. Describe inversion of the uterus, giving symptoms, diagnosis, and treatment.
2. Describe laceration of the cervix, giving causes, symptoms, and technique of repair.
3. Describe vesicovaginal fistula, giving causes, symptoms, prognosis, and treatment.
4. Describe uterine polypus, giving symptoms, diagnosis, and treatment.

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5. Differentiate between pyosalpinx and a salpingitis. Give technique of treatment of pyosalpinx.

BACTERIOLOGY.

1. Describe a practical bedside method for demonstrating the plasmodium malariae.
2. Enumerate the characteristics of the bacillus of diphtheria.
3. Describe in detail a method for demonstrating the existence of tubercle bacilli in the sputum.
4. Describe the steps which you would take to demonstrate by the microscope the existence of gonococci in the vaginal secretion.
5. What is meant by phagocytosis?

JURISPRUDENCE.

1. Give process and length of time, by and in which, a body is converted into adipocere.
2. Define paralytic dementia.
3. Give the post-mortem appearance of vaginal tract of third month of pregnancy.
4. Define illusions, delusions, hallucinations, and lucid intervals.
5. What is infanticide, in both a physiological and a medicolegal sense?

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

STATE BOARD OF HEALTH OF MISSOURI.

ANATOMY.

1. To locate the *fissure of Sylvius*, draw a line from a point one and a quarter inches behind the external angular process of the frontal bone and the same distance above the zygoma, to a point three-quarters of an inch below the most prominent part of the parietal eminence. (a) The main fissure will correspond to the first three-fourths of an inch along this line; (b) the horizontal limb will correspond to the rest of this line; (c) the ascending limb will correspond to a line one inch long, going upward (parallel to the coronal suture) from the junction of (a) and (b).
(b) Draw a straight line over the top of the scalp from the inion to the glabella; bisect this line, and half an inch posterior to the midpoint draw a line downward and forward at an angle of 67.5° for a distance of three and one-half inches. This line will represent the location of the *fissure of Rolando*.

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6. The muscles that flex the leg on the thigh are: Sartorius, Gracilis, Semitendinosus, Semimembranosus, Biceps, Gastrocnemius, Plantaris, Popliteus.

9. The structures divided in amputation of the arm at the middle third are: Skin, fascia, Biceps, Triceps, and Brachialis anticus muscles; brachial, superior profunda, and inferior profunda arteries; brachial, basilic, and cephalic veins; median, ulnar, internal cutaneous, musculospiral, and musculo-cutaneous nerves; and the humerus.

PHYSIOLOGY.

1. Section of the spinal accessory nerve would have a tendency to quicken the heart's action.

3. The acidity of the urine is due to acid sodium phosphate; vegetable diet tends to lessen the acidity of the urine.

4. There are two theories of color vision, as follows:

(a) *The Young-Helmholtz theory*, which assumes that there are three fundamental sensory elements in the retina which correspond to and are stimulated primarily by the primary colors—red, green, and violet; also that each color-perceiving element is slightly stimulated by others of the spectral rays. When red rays fall upon the retina they stimulate the red-perceiving elements strongly and the green and violet very feebly. The resulting sensation is that of red. So also is it with green and violet rays. When the retina is stimulated by both red and green rays the two corresponding color-perceiving elements are strongly stimulated. The resulting color perception, however, is a combination of the two sensations and corresponds to some region of the spectrum between the red and green, according to the relative intensity of the two stimuli. When all three color-perceiving elements are stimulated at the same time this theory assumes that white light will be perceived. In a similar manner all the various color sensations are arrived at.

(b) *Hering's theory*, which is based on the assumption that there are chemical substances in the retina, photogenic substances, which are stimulated by the colors of the spectrum. It assumes three photogenic substances which are called the red-green, the yellow-blue, and the white-black substances. By this theory, when the red-green substance is stimulated by red or green light, respectively, the former produces destructive or catabolic changes, the latter constructive or anabolic changes, in the substance. When red light falls upon the retina it produces catabolism in the red-green substance, which in turn develops a nerve impulse that arouses the sensation of red. When green light, on the other hand,

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stimulates the retina, it produces anabolism of the red-green substance and the sensation of green. The same rule holds with the other two substances. It will be noticed that this theory is based on the complemental colors. (From Kirkes' *Physiology*.)

5. White blood corpuscles are formed in the spleen, lymph glands, and lymphoid tissue; also from other white cells by direct cell-division in the blood stream; the eosinophiles may be derived from the bone marrow.

6. The *functions of the liver* are: (1) The secretion of bile, (2) the formation of glycogen, (3) the formation of urea and uric acid, (4) the manufacture of heat, and (5) the conversion of poisonous and harmful into inert material.

8. The *functions of the pancreas* are: (a) The secretion of the pancreatic juice, which (1) changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; (2) converts starch into maltose; (3) emulsifies and saponifies fats; and (4) causes milk to curdle.

(b) The manufacture of an internal secretion.

The *ferments secreted by the pancreas* are: Trypsin, amylpsin, steapsin, and a milk-curdling ferment.

9. The lymphatic circulation is, strictly speaking, not a circulation at all; since the lymph flows only in one direction, namely, toward the heart. The lymph capillaries take up any excess of the blood plasma which is not required for the nutrition of the tissues. These capillaries consist of a single layer of epithelium, and empty themselves into vessels very like the veins. The lymph vessels are well provided with valves, which are so closely approximated as to give the vessels a beaded appearance. All the lymphatic vessels, except those of the right upper half of the body, empty into the thoracic duct, which terminates in the left subclavian vein, where the left internal jugular vein also enters. Those from the right upper half of the body discharge into the right lymphatic duct, which, in turn, empties into the right subclavian vein at its junction with the right internal jugular vein.

10. The *functions of the skin* are: Protection, sense of touch, excretion, regulation of body temperature, absorption, and respiration.

CHEMISTRY.

1. The composition of cow's milk is:

Water87 per cent.
Solids13 per cent.
Proteids4 per cent.

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Fats	4	per cent.
Sugar	4	per cent.
Salts	0.7	per cent.

2. The urine should first be tested for albumin. If this be present, it should be removed by heating the urine to near the boiling point, and filtering from the coagulum.

(1) *Fehling's test*: Place in a test-tube a few c.c. of the liquid prepared as stated below, and boil; no reddish tinge should be observable, even after five minutes' repose. Add the liquid under examination gradually, and boil after each addition. In the presence of sugar a yellow or red precipitate is formed. In the presences of *traces* of glucose, only a small amount of precipitate is produced, which adheres to the glass, and is best seen when the blue liquid is poured out.

[The reagent must be kept in two solutions, which are to be mixed immediately before use. Solution I consists of 34.653 gms. of crystallized CuSO_4 , dissolved in water to 500 c.c.; and Solution II of 130 gms. of Rochelle salt dissolved to 500 c.c. in NaHO solution of sp. gr. 1.12. When required for use equal volumes of the two solutions are mixed, and the mixture diluted with four volumes of water.]

(2) *Boettger's test*: Render the urine strongly alkaline by addition of Na_2CO_3 . Divide about 6 c.c. of the alkaline liquid in two test-tubes. To one test-tube add a very minute quantity of powdered subnitrate of bismuth, to the other as much powdered litharge. Boil the contents of both tubes. The presence of glucose is indicated by a dark or black color of the bismuth powder, the litharge retaining its natural color. (From Witthaus' *Essentials of Chemistry*.)

3. Black ink is produced when tannic acid is brought into contact with ferruginous preparations.

4. Ethyl alcohol yields on oxidation first an aldehyde, then acetic acid; if the oxidation be very energetic the alcohol burns and is converted into carbon dioxide and water. Alcohol is acted upon by chlorine and bromine, with the production of chloral and bromal. Iodine acts upon alcohol in the presence of an alkali, to produce iodoform. Acids act upon alcohol, with the production of ethers and esters.

5. *Lime* is calcium oxide, CaO .

Lime water is a solution of lime in water, CaH_2O_2 .

Hard water is water containing an excess of calcareous salt; *temporary* hardness is due to the bicarbonates of calcium and magnesium; *permanent* hardness is due to the sulphates of these elements.

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THERAPEUTICS.

The doses of:

1. Arsenic trioxide, gr. 1/30.
2. Ipecac: As an expectorant, gr. j; as an emetic, gr. xv.
3. Tartar emetic: As an expectorant, gr. 1/10; as an emetic, gr. 1/2.
4. Caffeine, gr. j.
5. Heroin, gr. 1/20 to gr. 1/5.
6. Magnesia sulph., ℥iv.
7. Lobelia, gr. viijss.
8. Copaiba, ℥xxv.
9. Hydrastis, gr. xxx.
10. Ergot, gr. xxx.

PATHOLOGY.

2. In the first stage of typhoid fever Peyer's patches become swollen, hyperemic, and reddened; a few days later they appear as whitish or gray elevations, and the hyperemia has disappeared; the surface of the patch is smooth and its edge is sharply defined; after the first week necrosis may occur; the center of the patch becomes softer, more yellow, or sometimes even red from the absorption of blood pigment. The necrotic portion falls off, leaving an irregular ulcer with necrotic and undermined edges. These ulcers are elongated, with the long axis parallel with that of the intestine, and a smooth floor. The ulcers may heal or go on to perforation.

5. Degeneration is a local order of metabolism, in which the protoplasm of the cell is gradually changed into a new material. The principal forms are: Fatty, mucoid, colloid, cloudy, and amyloid.

PRACTICE.

1. Bell's palsy is paralysis of the facial nerve due to inflammation or other lesion of the facial nerve or its nucleus.

Symptoms: "When it is paralyzed, the muscles of the face being all powerless, the countenance acquires on the paralyzed side a characteristic, vacant look, from the absence of all expression; the angle of the mouth is lower, and the paralyzed half of the mouth looks longer than that on the other side; the eye has an unmeaning stare, owing to the paralysis of the Orbicularis palpebrarum. All these peculiarities increase the longer the paralysis lasts, and their appearance is exaggerated when at any time the muscles of the opposite side of the face are made active in any expression, or in any of their ordinary functions. In an attempt to blow or whistle, one side of the mouth and

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cheeks acts properly, but the other side is motionless, or flaps loosely at the impulse of the expired air; so, in trying to suck, one side only of the mouth acts; in feeding, the lips and cheek are powerless, and, on account of paralysis of the buccinator muscle, food lodges between the cheek and gums." (From Kirkes' *Physiology*.)

Treatment: If possible, remove the cause; potassium iodide, electricity, blistering, massage, local injections of a solution of strychnine have all been recommended.

3. In *cerebral apoplexy*: There are generally paralysis of the head and upper limbs; and in left-sided lesions there may be aphasia; the pulse is slow and full; the respirations are at first slow, regular, and stertorous, later on becoming of the Cheyne-Stokes type.

In *opium poisoning*: The pupils are contracted; there is no sign of paralysis; both respirations and pulse are slow and full.

4. *Romberg's sign* is the inability of a patient to stand with eyes closed and heels together without considerable swaying or even falling. It is found in locomotor ataxia.

Stellwag's sign is a complete, or almost complete, absence of winking as an involuntary act. It is found in exophthalmic goiter.

7. Hemophilia is a hereditary condition characterized by a tendency to bleed on the very slightest provocation. Males are more apt to be affected, but the predisposition is transmitted through the female line. The cause of the condition is unknown; the prognosis is bad.

8. A *papilloma* is a benign tumor composed of connective tissue and covered by one or more layers of epithelial cells.

OBSTETRICS.

5. The following table (from Dorland's *Obstetrics*) differentiates the two conditions; but a careful blood examination, by revealing the presence or absence of the *plasmodium malariae*, will render the diagnosis certain.

PUERPERAL SEPSIS.	MALARIAL INFECTION.
The chills are irregular in their appearance and are associated with marked alterations in the temperature rate. The constitutional disturbance is profound.	The chills occur at regular intervals, and are followed by the usual elevation of temperature and then a sweat. The constitutional depression is moderate, and quite out of proportion to the severity of the paroxysm.

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PUERPERAL SEPSIS.

The pulse rate is exceedingly rapid and ominous.

There will be associated uterine subinvolution and tenderness, and probably alteration in the lochia.

The patient's condition steadily grows worse without appropriate treatment.

MALARIAL INFECTION.

The pulse rate is in proportion to the amount of febrile reaction.

There will not be noted any peculiar local pelvic manifestations.

Within a few hours there will occur a marked amelioration of the symptoms.

9. A *dry birth* is a labor in which the membranes have ruptured prematurely and the liquor amnii has escaped before the cervix was dilated.

The management of a *rigid os uteri* consists in: The administration of chloral hydrate, gr. xv., three doses being given at intervals of about twenty or thirty minutes; hot vaginal douches directed against the anterior lip of the os; if these methods do not suffice, it may be necessary to give an anesthetic, forcibly dilate the cervix, and deliver by forceps; the cervical laceration, if any, must be repaired.

BACTERIOLOGY.

2. The *characteristics of the bacillus of diphtheria*: The bacilli are from 2 to 6 mikrons in length and from 0.2 to 1.0 mikron in breadth; are slightly curved, and often have clubbed and rounded ends; occur either singly, or in pairs, or in irregular groups, but do not form chains; they have no flagella, are non-motile, and aerobic; they are noted for their pleomorphism; they do not stain uniformly, but stain well by Gram's method and very beautifully with Loeffler's alkaline-methylene blue.

3. To demonstrate the existence of *tubercle bacilli* in the sputum: The sputum must be recent, free from particles of food or other foreign matter; select a cheesy-looking nodule and smear it on a slide, making the smear as thin as possible. Then cover it with some carbolfuchsin, and let it steam over a small flame for about two minutes, care being taken that it does not boil. Wash it thoroughly in water and then decolorize by immersing it in a solution of any dilute mineral acid for about a minute. Then make a contrast stain with solution of Loeffler's methylene blue for about a minute; wash it again and examine with oil immersion lens. The tubercle bacilli will

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appear as thin red rods, while all other bacteria will appear blue.

4. To demonstrate *gonococci* in the vaginal secretion: On a cover-glass make a smear with the discharge as thin as possible, and let it dry in the air; cover it with a freshly-made solution of anilin-oil-gentian-violet for one or two minutes; wash it in distilled water; leave it in Gram's solution for two minutes; wash it in 95 per cent. alcohol until decolorized; wash it in distilled water; counterstain with a dilute carbolfuchsin without heat, or with a saturated aqueous solution of Bismarck brown; wash in distilled water, dry with filter paper, mount, and examine with an oil-immersion lens. The gonococci will appear as *diplococci within the leucocytes*, which have been decolorized by Gram's stain, and have taken the counterstain.

5. Phagocytosis is the faculty of certain cells (notably the mononuclear and polynuclear leucocytes) to take up and destroy bacteria and other foreign matter.

MEDICAL JURISPRUDENCE.

1. *Adipocere formation* only occurs when an animal fat is in contact with nitrogenous material. It is a process of saponification, the result being an ammonium soap, except when the body has been immersed in water containing excess of calcium salts, in which case a calcium soap is formed. The process is hastened by immersion in water, or even by moisture; it commences where fat is most abundant and gradually proceeds through the greater part of the body. It usually takes about three years for a body buried in the earth to be converted into adipocere; but the age and development of the body, as well as the nature of the soil may modify the length of time required.

2. *Paralytic dementia* is a gradually progressive and chronic inflammation and degeneration of the cerebral cortex; it is characterized by failure of memory, changed disposition, delusions of grandeur, and may lead to epilepsy and paralysis.

4. A *delusion* is a belief in something which has no real existence, but is purely imaginary; and out of which the person cannot be reasoned. An *illusion* is a false or perverted impression, received through one of the senses. An *hallucination* is the same as an illusion, but without any material basis.

If an individual believes himself to be made of glass, and is afraid of being touched lest he be broken, he is suffering from a *delusion*. If the whistling of the wind is mistaken for a voice telling a person to do a certain thing—that would be an *illusion*. If a person fancied he heard a voice

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when there was nothing at all to be heard, that would be an *hallucination*.

A *lucid interval* (in insanity) is a period in which there is a temporary cessation of the insanity, or a complete restoration to reason.

5. *Infanticide in a medicolegal sense* is the murder of a newborn child, which has a separate existence from its mother.

In a *physiological sense* it would include the destruction of the life of a fetus or child before it was separated from its mother.

STATE BOARD EXAMINATION QUESTIONS.

NEBRASKA STATE BOARD OF HEALTH EXAMINATIONS.

ANATOMY.

1. Give a general description of the skin; describe the layers, and the special structures and appendages.
2. Give brief description of the animal cell.
3. Describe the mastoid portion of the temporal bone.
4. Discuss briefly the thyroid body.
5. Give the peritoneal relations of the colon.
6. Give the peritoneal relations and connections of the bladder.
7. Give the origin of the vessels of the uterus and the ovaries.
8. Briefly describe the shoulder joint and name its ligaments.
9. Name all the orifices of the diaphragm, also the structures passing through each orifice.
10. Give the origin and insertion of the muscles of the abdominal walls.

PHYSIOLOGY.

1. (a) Give the varieties of cartilage. (b) Give distribution. (c) State how cartilage is formed and nourished.
2. Describe the normal heart sounds and give the area of maximum intensity of the sounds of the chest wall.
3. Describe the sphygmograph and make a sphygmographic drawing of a normal pulse, also a drawing of a pulse in mitral insufficiency.
4. What are the accepted theories as to the origin of the white blood corpuscle; the red blood corpuscle; state the relative proportion of the white and red corpuscles in the human body.
5. Name the digestive ferments and give the origin and action of each.
6. Explain in detail how the functions of the auditory organs are performed.

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7. Give the functions of the kidney; state what causes the acidity of the urine.
8. Name the ductless glands of the body and give the latest theory of the function of each gland.
9. Describe the process of ovulation.
10. Explain arterial tension and show by what nervous and mechanical agencies it is maintained.

CHEMISTRY.

1. Define chemical action; physical action; give examples of each.
2. What is the atomic theory?
3. Give the average amount and composition of normal urine voided by an adult in twenty-four hours.
4. Name and describe the method of using two tests for the detection of sugar and albumin in the urine.
5. Name the enzymes of the pancreatic juice and give the functions of each one.
6. Name six metals and six nonmetals.
7. How would you detect arsenic in the contents of the stomach?
8. Why is the administration of albumen useful in poisoning?
9. Where is oxygen found in the human body and what are its important uses in the animal economy?
10. Give the common name and properties of mercurous chloride; of corrosive sublimate. Mention an easily applied test that will distinguish one from the other.

MATERIA MEDICA AND THERAPEUTICS.

1. Write a prescription for the following: Lithemia, dysuria, chorea.
2. Name the impurities in water that may cause diarrhea.
3. Mention and describe the diseases of animals that are communicable to man and state the means to be employed for their prevention in man.
4. Under what conditions would you prescribe the following: Capsicum, strophanthus, iodine, nux vomica, tr. aconite?
5. What is the composition of compound cathartic pill, brown mixture, Fowler's solution, and Donovan's solution?
6. Diphtheria antitoxin; how and when is it used; give doses, prophylactic and curative; how is it obtained?
7. How would you manage a case of typhoid fever; how prevent its spread?
8. What are the therapeutic uses of mineral acids? Name five.
9. How would you manage a case of tuberculosis?

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What precautions would you employ to prevent its spread?

10. Give the adult dose of the following drugs: Strychnine, atropine, adrenalin, nitroglycerin, belladonna, codeine; sulphonal, morphine, acetanilid, hyoscine, and ether.

PATHOLOGY.

1. Give the pathology of aneurysm.
2. Define myomata, neuromata, angiomata.
3. What part of the cord is involved in locomotor ataxia? Give the pathology of same.
4. Differentiate between osteomyelitis and inflammatory rheumatism.
5. Give the pathology of typhoid fever.
6. Differentiate between scarlet fever and measles.
7. Give the etiology and pathology of pericarditis and name the different forms.
8. Describe fibrinous pneumonia.
9. What is hydrosalpinx? Give its pathology.
10. Give the pathology of simple acute catarrh of the intestines.

PRACTICE.

1. Give etiology, diagnosis, treatment, and prognosis of erysipelas.
2. What are the causes and give treatment of palpitation of the heart.
3. Differentiate the classes of croup and give the treatment for each.
4. Define neurasthenia and give etiology, symptomatology and treatment.
5. Give etiology and treatment of eclampsia infantum.
6. Give the diagnosis and treatment of lobar pneumonia.
7. Diagnose and outline the treatment for obstruction of the cystic duct; and of the common bile duct.
8. What is herpes zoster? Give the cause and treatment.
9. Give the treatment of chronic follicular pharyngitis; give treatment of acute catarrhal laryngitis.
10. Give etiology, characteristic symptoms, and treatment of acute chorea.

OBSTETRICS.

1. (a) Describe the changes that take place in the breasts as a result of pregnancy. (b) What disease of the breasts is most apt to follow labor and what prophylactic measures would you adopt to prevent it?
2. Give the etiology, symptoms, sequelæ, and treatment of septic endometritis (nonspecific).
3. What is subinvolution? Give symptoms and treatment.

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4. What is the treatment of placenta prævia, hemorrhages occurring before full term? How would you manage it?

5. Give the causes, symptoms, and management as best understood and practised at present, of albuminuria of pregnancy.

6. (a) Give the causes of retroversion and retroflexion of the uterus. (b) Give the differential diagnosis between the two. (c) Give the treatment for each.

7. What are the symptoms of the so-called puerperal insanity? Give an outline of its treatment.

8. Name three of the most common causes of premature birth.

9. How would you diagnose the presence of a ruptured uterus and what treatment is called for?

10. Give the treatment for gonorrheal vaginitis.

SURGERY.

1. Differentiate between epithelioma and lupus.

2. What symptoms would indicate a rupture of the middle meningeal artery, following an injury to the head, and by what superficial landmarks would you locate it?

3. Differentiate between eczema, dermatitis, and syphilis.

4. Give some of the chief causes of delayed union in fractures and the treatment you would adopt for each cause.

5. Describe the several forms of corneal ulcer; their causes and treatment.

6. Give diagnosis, course, and treatment of gonorrheal arthritis.

7. Give the indications for tracheotomy and describe how same is performed.

8. What is synovitis? Give the causes, symptoms, and treatment.

9. What is phlebitis? Give causes, symptoms, and treatment.

10. Give the indications for the removal of the prostate gland.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

NEBRASKA STATE BOARD OF HEALTH EXAMINATIONS.

ANATOMY.

5. The *ascending colon* is generally covered with peritoneum on its anterior surface and the two sides; the posterior surface is generally uncovered.

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The *transverse colon* is completely covered with peritoneum except on the first few inches of the posterior surface.

The *descending colon* is generally covered with peritoneum on its anterior surface and sides only; the posterior surface is destitute of peritoneal covering.

In the *sigmoid flexure* the lower or pelvic portion is entirely covered by peritoneum; the upper or iliac portion is generally only covered by peritoneum on its anterior and two lateral surfaces.

6. The superior surface of the bladder is covered by peritoneum. "From each lateral border the peritoneum passes (*lateral false ligaments*) to the pelvic wall, lining a groove (*paravesical fossa*) which is present on each side when the bladder is empty. Anteriorly the peritoneum passes (*anterior false ligaments*) over the urachus to the anterior abdominal wall, at the upper border of the symphysis when the bladder is empty; two or more inches higher when the bladder is full. Along the posterior border the peritoneum passes to the rectum or uterus, forming a fold (*posterior false ligament*) at each side of the rectovesical or uterovesical pouch.

The base is chiefly fixed by the *true ligaments*, processes of the pelvic fascia reaching in front from the pubis, and laterally from the sides of the pelvis. It is fixed to the anterior abdominal wall above by the urachus. It is also fixed by fibrous tissue to the ureters, seminal vesicles, and vasa deferentia (or vaginal walls).

7. The *uterus* is supplied by the uterine artery (from the internal iliac) and the ovarian artery (from the aorta).

The *ovaries* are supplied by the ovarian arteries (from the aorta).

9. The *orifices of the diaphragm* are: (1) The aortic, transmitting the aorta, vena azygos major, and the thoracic duct; (2) the esophageal, transmitting the esophagus, pneumogastric nerves, and some small esophageal arteries; (3) the opening for the vena cava, transmitting the inferior vena cava, and small branches of the right phrenic nerve; (4) the right crural, transmitting the right splanchnic nerves; (5) the left crural, transmitting the left splanchnic nerves and the vena azygos minor.

PHYSIOLOGY.

2. There are two normal heart sounds which follow in quick succession, and are succeeded by a pause. The first, or systolic, sound is dull and somewhat prolonged; the second, or diastolic, sound is sharper and shorter. The sounds may be expressed by the syllables *lubb—dup*.

The first sound is heard best at the apex beat in the

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fifth left intercostal space; the second sound is heard best over the second right costal cartilage.

4. The white blood corpuscles are supposed to be made in the lymphatic glands; the red ones in the red bone marrow.

The proportion of white to red corpuscles is about 1:700.

5.

DIGESTIVE FERMENTS.	ORIGIN.	ACTION ON FOOD MATERIALS.
Ptyalin.	Saliva.....	Changes starches into dextrin and sugar.
Pepsin.	Gastric Juice....	Changes proteids into proteoses and peptones in an acid medium.
A curdling ferment.		Curdles the casein of milk.
Trypsin.		Changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; in an alkaline medium.
Amylopsin.	Pancreatic Juice.	Converts starches into maltose.
Steapsin.		Emulsifies and saponifies fats.
A curdling ferment.	Intestinal Juice..	Curdles the casein of milk.
Invertin.		Converts maltose into glucose.

6. "The waves of sound are gathered together by the pinna and external auditory meatus, and conveyed to the membrana tympani. This membrane, made tense or lax by the action of the tensor tympani and laxator tympani muscles, is enabled to receive sound waves of either high or low pitch. The vibrations are conducted across the middle ear by a chain of bones to the foramen ovale, and by the column of air of the tympanum to the foramen rotundum, which is closed by the second membrana tympani, the pressure of the air in the tympanum being regulated by the Eustachian tube. The internal ear finally receives the vibrations, which excite vibrations successively in the perilymph, the walls of the membranous labyrinth, the endolymph, and, lastly, the terminal filaments of the auditory nerve, by which they are conveyed to the brain." (Brubaker's *Physiology*.)

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7. The function of the kidney is to separate the urine from the blood, and to excrete urea.

The acidity of the urine is due to the presence of acid sodium phosphate.

8. The *ductless* glands are: The spleen, thymus, thyroid, parathyroids, suprarenals, carotid, coccygeal, pituitary and pineal glands.

The *function of the spleen*: The following theories have been held: (1) It is a source of production of the white blood corpuscles; (2) it is a source of production of the red blood corpuscles during fetal life; (3) it is a place where the red blood corpuscles are destroyed; (4) uric acid is produced in the spleen; (5) an enzyme is produced in the spleen and is carried by the blood to the pancreas, where it converts the trypsinogen into trypsin.

The *function of the thymus* is not settled; it is said: (1) To be a blood forming organ; (2) to have influence on growth and nutrition; (3) in hibernating animals it is supposed to store up materials which can be utilized during the period of inactivity.

The *function of the thyroid* is not definitely settled; (1) it has some trophic function; (2) it is supposed to antagonize toxic substances; (3) it produces an internal secretion.

The *function of the suprarenals* is not definitely settled; they produce an internal secretion which is probably necessary to life; it is supposed that they are able to destroy or remove some toxic substance produced elsewhere in the body.

The function of the *other* ductless glands is unknown. They all, or nearly all, furnish an internal secretion.

CHEMISTRY.

1. "A bar of soft iron may be made to emit light when heated, or sound when caused to vibrate, or magnetism when under the influence of an electric current. Under the influence of these *physical forces* the iron suffers no change in composition, and, on cessation of the action of the inciting force, the iron returns to its original condition. But if the iron be heated in an atmosphere of oxygen, both the iron and a part of the oxygen disappear, and a new substance, a new chemical species, is produced, having properties of its own, different from those of either the iron or the oxygen. In this case there has been *chemical action*, causing change of composition, as the new substance contains both iron and oxygen. The result of such action is, moreover, permanent, and the new product continues to exist, until modified by some new manifestation of chemical action." (Witthaus' *Manual of Chemistry*.)

2. The atomic theory regards matter as not being in-

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finitely divisible, but as being composed of indivisible particles called atoms. Dalton, by ascribing to each atom a relative weight as compared with the weight of other atoms, was able to explain and produce reasons for all the observed numerical laws of chemical combination.

3. The following table (from Dunglison's *Medical Dictionary*) gives the average composition of normal urine:

(PARTS IN 1000.)		VOIDED PER DAY	
		Grains	Grams
Water	950.00		
Urea	28.00	520.80	35.00
Uric acid	0.60	11.16	0.75
Hippuric acid	0.35	6.51	0.44
Creatinin	0.05	12.09	0.81
Extractives	8.00	148.80	10.00
Sodium chloride	8.00	148.80	10.00
Phosphoric acid	2.00	37.20	2.50
Sulphuric acid	1.25	23.45	1.56
Lime (CaO)	0.25	4.65	0.31
Magnesia (MgO)	0.30	5.58	0.37
Potash (K ₂ O) and soda, (Na ₂ O)	0.60	11.16	0.75
Total	1000.00	930.20	62.49

The average amount of urine voided in twenty-four hours is about fifty ounces.

4. TWO TESTS FOR THE DETECTION OF SUGAR IN THE URINE: The urine should first be tested for albumin. If this be present, it should be removed by heating the urine to near the boiling point, and filtering from the coagulum.

(1) *Fehling's test*: Place in a test-tube a few c.c. of the liquid prepared as stated below, and boil; no reddish tinge should be observable, even after five minutes' repose. Add the liquid under examination gradually, and boil after each addition. In the presence of sugar a yellow or red precipitate is formed. In the presence of *traces* of glucose, only a small amount of precipitate is produced, which adheres to the glass, and is best seen when the blue liquid is poured out.

[The reagent must be kept in two solutions, which are to be mixed immediately before use. Solution I consists of 34.653 gms. of crystallized CuSO₄, dissolved in water to 500 c.c.; and solution II of 130 gms. of Rochelle salt dissolved to 500 c.c. in NaHO solution of sp. gr. 1.12. When required for use equal volumes of the two solutions are mixed, and the mixture diluted with four volumes of water.]

(2) *Boettger's test*: Render the urine strongly alkaline by addition of Na₂CO₃. Divide about 6 c.c. of the alkaline liquid in two test-tubes. To one test-tube add a very minute quantity of powdered subnitrate of bismuth, to the

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other as much powdered litharge. Boil the contents of both tubes. The presence of glucose is indicated by the dark or black color of the bismuth powder, the litharge retaining its natural color. (From Witthaus' *Essentials of Chemistry*.)

TWO TESTS FOR THE DETECTION OF ALBUMIN IN THE URINE: "The urine must be perfectly clear. If not, it is to be filtered, and if this does not render it transparent, it is to be treated with a few drops of magnesia mixture and again filtered."

I.—*The heat test*: "The reaction is first observed. If it be acid, the urine is simply heated to near the boiling point. If the urine be neutral or alkaline, it is rendered faintly acid by the addition of dilute acetic acid, and heated. If albumin be present, a coagulum is formed, varying in quantity from a faint cloudiness to entire solidification, according to the quantity of albumin present. The coagulum is not redissolved upon the addition of HNO_3 ."

II.—*Heller's modification of the nitric acid test*: "Place in a test-tube a layer of HNO_3 about 2 centim. in thickness; then, with a pipette, carefully float upon the surface of this a layer of the urine in such a manner that the liquids do not mix. If albumin be present, a cloudy ring appears at the point of junction of the two layers, the borders of the cloud being sharply defined. A cloudy ring may be formed by the presence of an excess of urates, but in this case it is not *at*, but *above*, the point of junction of the layers, and its upper border is not sharply defined, but fades off gradually." (Witthaus' *Essentials of Chemistry*.)

5. See above, *PHYSIOLOGY*, Question 5.

6. *Six metals*: Mercury, copper, zinc, lead, gold, silver.

Six nonmetals: Hydrogen, oxygen, nitrogen, fluorine, chlorine, sulphur.

7. *Arsenic* in the stomach contents can be detected by *Reinsch's test*, as follows: To the suspected fluid add a little pure HCl ; suspend in the fluid a small strip of bright copper foil, and boil. If a deposit forms on the copper, remove the copper, wash it with pure water, dry on filter paper, but be careful not to rub off the deposit. Coil up the copper, and put it into a clean dry glass tube, open at both ends, and apply heat at the part where the copper is. If arsenic is present there will appear in the cold part of the tube a mirror, which will be found on microscopical examination to consist of octahedral crystals of arsenic trioxide.

8. The administration of albumin is useful in many cases of poisoning, because the albumin forms more or less insoluble compounds with most of the metallic salts, mineral acids, corrosive alkalies, and some of the alkaloïds.

9. Oxygen is found in the human body in the blood

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plasma, and in combination in almost every tissue of the body.

Its uses in the animal economy are: To maintain respiration, aerate the blood, oxidize the tissues, and thus to supply heat and energy. It supports life and combustion.

10. *Mercurous chloride* or *calomel* is a heavy, white powder; amorphous; tasteless and odorless; it is insoluble in cold water and in alcohol, and very slightly soluble in boiling water; when exposed to the light it becomes discolored (first yellow, then gray) and partially decomposed; it sublimes without fusing; it is incompatible with the mineral acids, with the alkaline chlorides, bromides, and iodides.

Corrosive sublimate is heavy, white and crystalline; it has a strong, acrid, styptic taste, and is soluble in water, in alcohol, and in ether; it is decomposed by exposure to light.

They can be easily distinguished by their solubility.

MATERIA MEDICA AND THERAPEUTICS.

1. *For Lithemia:*

℞ Potassii acetatis.
Potassii bitartratis.
Potassii citratis aa ʒss.
Aquæ destillatæ q.s. ad ʒviii. Misce.

Signa:—One tablespoonful in half a glass of water after each meal.

For Dysuria: If due to acute cystitis, the above prescription will do here also.

For Chorea:

℞ Chloralis hydrastis, ʒij
Sodii bromidi, ʒiv
Aquæ destillatæ, q.s. ad ʒij. Misce.

Signa:—One teaspoonful in water, every five hours, for three doses.

2. The impurities in water that may cause diarrhea, are: Suspended mineral matters, suspended animal (fecal) and vegetable matters, fetid gases, and an excess of dissolved nitrogenous organic matter.

3. "Among the most common of the diseases and parasites of animals, which are communicable to man, are: (1) Glanders, a disease of the genus *Equus*, generally fatal when contracted by man; (2) anthrax, a disease of horses, cattle, sheep, and swine, appearing in man either as malignant pustule or as internal anthrax, and often fatal; (3) tuberculosis, a disease common in cattle and swine, but also occurring in horses, sheep, goats, dogs, poultry, cage birds, and menagerie animals; (4) rabies, a disease of the genus *Canis* communicable to all warm-blooded animals and to man; (5) epizotic aphtha, com-

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monly known as foot-and-mouth disease, a very infectious malady of cattle, sometimes communicated to the consumers of the milk of diseased cattle; (6) *Cysticercus bovis*, found in cattle, is the larval form of the tapeworm of man known as *Tænia saginata*; (7) *Cysticercus cellulosæ*, found in swine, is the larval form of the tapeworm of man known as *Tænia solium*; (8) the *Trichina spiralis*, a common parasite of swine, may develop in man and sometimes produces fatal results; (9) the *Echinococcus* found in the lungs, liver, and other organs of the meat-producing animals is the cystic phase of the *Tænia echinococcus* of the dog.

“It is evident that the most satisfactory way of protecting man from this source of danger is to eradicate these diseases and parasites so far as possible from the domesticated animals. As complete eradication cannot be accomplished for many years and in some cases not at all, there must be constant efforts for repression and control. People must be made familiar with the dangers; too close association with animals should be avoided; the inspection of meat and of dairy cows should be universal; swine flesh should be well cooked; hides, wool, and hair, often infected with the anthrax bacillus, should be handled with suitable precautions; biological products used for the prevention or cure of human diseases should be surrounded with every safeguard to avoid contamination.” (*Reference Handbook of the Medical Sciences.*)

5. *The compound cathartic pill* consists of:—Calomel, about one grain; compound extract of colocynth, about one and a quarter grains; resin of jalap, about half a grain; and gamboge, about one-quarter of a grain.

Brown mixture is compound mixture of glycyrrhiza, and contains extract of glycyrrhiza, syrup, acacia, wine of antimony, spirit of nitrous ether, camphorated tincture of opium, and water.

Fowler's Solution is liquor potassii arsenitis, and contains arsenic trioxide, potassium bicarbonate, compound tincture of lavender, and water.

Donovan's Solution is liquor arseni et hydrargyri iodidi, and contains arsenic iodide, mercuric iodide, and water.

7. To prevent the spread of typhoid, each household should boil all water that is to be used for drinking or for washing dishes, etc.; milk should be boiled also; and no ice should be put in water or other drink or food; flies should be kept out of the house as far as possible, by means of screens or otherwise; all discharges from the sick person must be disinfected; all utensils, dishes, etc., used by the patient must be thoroughly cleansed, and boiled every day; soiled linen must be soaked in a disinfectant solution before being washed; after each attend-

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ance on a patient physicians, nurses, and others should wash their hands in a disinfectant; thorough sterilization of all bedding, etc., must be performed after the disease is over.

9. Suitable measures for preventing the spread of tuberculosis would include: Careful disinfection or burning of sputum, etc.; avoidance of spitting in public places; plenty of fresh air and sunlight; an abundance of good and easily digested food; the proper inspection of food supplies; the avoidance of kissing; and reporting of cases to the proper health authorities, and cooperation with them.

10. Adult doses: Strychnine, gr. $\frac{1}{64}$; atropine (sulphate), gr. $\frac{1}{160}$; adrenalin, mxx. of a one per cent. solution; nitroglycerin, one minim of a one per cent. solution; belladonna (alcoholic extract of), gr. $\frac{1}{5}$; codeine, gr. $\frac{1}{2}$; sulphonal, gr. xv; morphine, gr. $\frac{1}{4}$; acetanilid, gr. iv; hyoscin (hydrobromate), gr. $\frac{1}{128}$; ether, mxxv.

PATHOLOGY.

3. In *locomotor ataxia* the posterior columns of the spinal cord and the posterior nerve roots are involved.

The posterior columns of the spinal cord are gray and shrunken, and show considerable overgrowth of connective tissue in the columns of Goll, Burdach, and Lissauer; this process extends upward from the lumbosacral region; the posterior nerve roots degenerate and become atrophic. The meninges over the affected parts become opaque and adherent. Some of the cranial nerves may also atrophy, notably the optic, but also the motor oculi and vagus.

The process is destructive and progressive; it is not a simple wasting, although the nerve fibers are atrophied, but it is characterized by irritation, changes in the axis cylinders, overgrowth of the connective tissue, and sometimes congestion; the spinal ganglia may be affected.

4. In *osteomyelitis* the shaft of the bone is usually attacked, the fever is moderate only, there are no acid sweats, and heart lesions are not usually present.

In *rheumatism* the joints are usually attacked, and more than one may be involved, the fever may be high, acid sweats are present, and the heart is usually involved.

6. In *scarlet fever* the eruption is brighter, is on a red background, punctiform, and is more uniform; the temperature is higher, the pulse quicker; the tongue is of the "strawberry" type, the lymphatics in the neck may be swollen, and there is sore throat.

In *measles* the eruption is darker, less uniform, more shotty; the temperature is lower, pulse slower, the tongue is not of the "strawberry" type; coryza, coughing, and sneezing may be present.

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PRACTICE.

2. **PALPITATION OF THE HEART.** *Causes:* Anemia, neurasthenia, fright, hysteria, anxiety, indigestion, alcohol, tea, coffee, tobacco, excitement, unusual physical exertion, organic disease of the heart.

Treatment: If possible, remove the cause; institute proper hygiene and diet; moderate exercise, abstention from excesses of any kind, warm baths, regular hours, and rest are necessary; aconite, iron, strychnine, and bromide of potassium have each been recommended; electricity, Weir-Mitchell rest cure, and a mild mountain climate have been suggested.

3. *Membranous or True croup* is either laryngeal diphtheria or a streptococcus infection. In either case there is a prior stage of malaise, accompanied by chills, fever, and sore throat. The fever may become very high. A membrane forms, in which are found the Klebs-Loeffler bacillus or streptococci. *False or Spasmodic croup* generally comes on suddenly, at night. There is no appreciable fever, no previous malaise or sickness, and often the patient is asleep again by the time the physician arrives. There is frequently a thick tenacious mucus, but neither Klebs-Loeffler bacilli nor streptococci are present. It is entirely a local disturbance.

5. *Causes of eclampsia infantum* are: "Overeating, especially of indigestible food; rachitis, debility from exhausting diarrheal diseases; high fever, especially at the onset of the acute specific infections; very seldom dentition, phimosis, and acute middle-ear inflammation; injuries to the brain at birth, infantile hemiplegia, meningitis, and tumor of the brain; rarely of spinal cord disease.—(From Butler's *Diagnostics of Internal Medicine*.)

OBSTETRICS.

1. (a) The changes that take place in the breasts as a result of pregnancy: The breasts increase in size and vascularity, and feel knotty; the areola becomes darker and wider; a secondary areola develops; the nipple and glandular follicles around it become larger; fluid can sometimes be squeezed out of the nipples, especially towards the end of pregnancy.

(b) Following labor, mastitis, due to septic infection, may occur. This can only be prevented by the best antiseptic precaution; the breast must be kept clean, the nipple dry, and the parts are not to be touched by the patient, and only by the physician or nurse after the most thorough antiseptic precautions. The nipple should be kept clean by boric acid solution, and the breast should not be allowed to get engorged.

MEDICAL RECORD.

8. Three of the most common causes of premature birth: Syphilis, endometritis, and the abuse of drugs (oxytocics).

SURGERY.

I.

EPITHELIOMA.	LUPUS.
Cancerous.	Tuberculous.
Generally occurs in adults.	Generally occurs in young people.
Infiltrates the tissues, and may extend rapidly.	Spreads slowly, and may heal at one part while breaking down at another.
Glands are involved.	No glandular involvement.
Usually painful.	Not usually painful.
Cachexia is present.	No cachexia.

STATE BOARD EXAMINATION QUESTIONS.

NEVADA STATE BOARD OF MEDICAL EXAMINERS.

ANATOMY.

- 1-3. Give function of hyoid bone. From what bones and by what ligaments is it suspended?
4. Which rib is considered the most typical?
5. Bound the astragalus.
6. Name the muscle on the dorsum of the foot.
7. Describe the axillary artery in its origin and termination.
8. How is the inferior vena cava formed, and where does it terminate?
9. Give special names by which the twelve pairs of nerves are generally known.

PHYSIOLOGY.

1. What is the function of the sixth (abducens) nerve?
2. Describe a complete physiological revolution of the heart.
3. Describe the action of the kidneys, and give the normal constituents of urine.
4. Describe the process of segmentation of the ovum.
5. Name the secretions of the alimentary canal, and give the functions of each.
6. What are the functions of the spinal cord?
7. What are amyloid foods? Proteid foods? Give an example of each.

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8. What experiments have been made to prove the glycogenic function of the liver?
9. What are the functions of the brain membranes?
10. Describe the phenomena of (a) asphyxia, (b) syncope, (c) sleep.

MATERIA MEDICA AND THERAPEUTICS.

1. What is a decoction; an infusion; a mixture; an emulsion?
2. Give the therapeutic uses of purgatives.
3. Name remedies having a special action upon the kidneys, with indication for and against their use.
4. Name remedies having a special action on heart with indication for and against use.
5. Give the uses of alcohol.
6. Name the various preparations of opium, with dose of each.
7. Indicate condition in which potassium iodide would be useful.
8. What is the dose of veratrum viride? Under what condition can larger dose be used?
9. Indicate the various uses of quinine.
10. Indicate the various uses of iron.

CHEMISTRY AND TOXICOLOGY.

1. Give the physical and chemical qualities of calomel; corrosive sublimate.
2. With what preparations of mercury should the iodides never be combined?
3. Write three prescriptions in which a chemical change takes place.
4. Define difference between mixture and chemical combination.
5. With what are the following drugs incompatible: Iron, mercury, the alkaloids?
6. Name a vegetable poison. Give symptoms of and treatment for poisoning by same.
7. Name a mineral poison. Give symptoms of and treatment for poisoning by same.
8. Describe a case of carbolic acid poisoning. Give treatment for same.
9. What symptoms would indicate over-absorption of carbolic acid from a surgical dressing?
10. Name antidotes for opium, belladonna, digitalis, arsenic, and hemlock.

PATHOLOGY.

1. Give the pathology of acute anterior poliomyelitis.
2. Give the pathology of a chancre of the prepuce.

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3. Give the causes of edema.
4. What are the indications of an inflammation?
5. What is thrombosis? How formed?
6. Give the pathology of chronic diffuse nephritis.
7. Give the macroscopical appearance of the lung in the various stages of pneumonia.
8. Give the pathology of cystic ovary.
9. What pathological changes occur during a case of scarlet fever of ordinary severity?
10. Give the pathology of croupous colitis.

BACTERIOLOGY AND HYGIENE.

1. Name and describe the microorganism that produces the plague. Where is it chiefly found?
2. What is a pure culture? How made?
3. How would you diagnose malaria from typhoid fever by the microscope?
4. What is Koch's law?
5. What measures would you take to prevent the spread of tuberculosis?
6. What causes yellow fever? How would you prevent its spread?
7. Suppose a new-born baby were found dead, what would you do to find out whether it was a case of murder or not?
8. Mention four mineral disinfectants, three organic, and three gaseous.
9. What in your opinion should be done in regards to the "social evil" by the municipality or State?
10. Describe the *Bacillus anthracis*.

MEDICINE AND THERAPEUTICS.

1. Give symptoms and parts affected in rachitis.
2. Give stages in pneumonia and treatment of a case from beginning.
3. Where are the lesions in arthritis deformans, and give symptoms?
4. Give causes, symptoms, and pathological anatomy of diabetes mellitus.
5. Give causes, symptoms, and treatment of hemophilia.
6. Make a fever chart of a typical case of typhoid.
7. Give differential diagnoses of gastric catarrh, gastric ulcer, and gastric cancer, and give treatment for gastric ulcer.
8. What are the symptoms of the atrophic form of cirrhosis of the liver?
9. Give symptoms and treatment of pneumothorax.
10. Give differential diagnosis of pericarditis with effusion, and dilatation of heart, and treatment of the pericarditis.

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SURGERY.

1. Name the causes of intestinal obstruction.
2. What are the chief surgical diseases of the groin?
3. How are wounds classified?
4. What agents are employed for the production of local anesthesia?
5. What are the causes of secondary hemorrhage?
6. What structures are divided in the operation for strangulated femoral hernia?
7. How are amputations classified in regard to time of operating? What period is most favorable for operation?
8. Describe the operation for ligature of the subclavian artery at its second part.
9. Give symptoms and treatment of section of the median nerve.
10. How would you diagnose and reduce a backward dislocation of the forearm?

GENITOURINARY DISEASES.

1. Give differential diagnoses of simple and specific urethritis.
2. Make a classification of the syphilodermata.
3. Give your treatment of tertiary stage of syphilis.
4. Give different treatments for organic stricture, and give details of each.
5. What is your treatment for hydrocele? Give differential diagnosis.
6. Describe a syphilitic cornea.
7. What are symptoms, causes, and treatment of herpes progenitalis?
8. Give complications of a posterior urethritis.
9. Describe Hutchinson teeth, and what is the cause.
10. What are the symptoms of cowperitis?

OBSTETRICS.

- 1-2. Give etiology and symptoms of what is generally denominated kidney of pregnancy.
3. What varieties of mellituria may be observed in pregnant women?
4. What organ is most at fault for autointoxication in pregnancy?
5. In what proportion do compound presentations occur in labor?
6. Diagnose a prior pregnancy.
7. Can the sex of the fetus *in utero* be determined?
8. Give etiology and diagnosis of uterine inertia.
9. Give your technique in podalic version.
10. Give absolute indications for cesarean section.

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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

NEVADA STATE BOARD OF MEDICAL EXAMINERS.

ANATOMY.

1-3. The function of the hyoid bone is to support the tongue and to afford attachment to several muscles.

It is suspended from the styloid processes of the temporal bones by the stylohyoid ligaments.

4. The seventh rib is considered the most typical.

5. The astragalus is bounded: Above by the tibia, below by the os calcis, internally by the internal malleolus of the tibia, externally by the external malleolus of the fibula, in front by the scaphoid or navicular.

6. The muscle on the dorsum of the foot is the extensor brevis digitorum.

7. The axillary artery begins at the outer border of the first rib, and ends at the lower border of the tendon of the Teres major muscle; it is continuous with the subclavian artery above, and with the brachial artery below.

8. The inferior vena cava is formed by the junction of the two common iliac veins; it terminates in the lower and back part of the right auricle of the heart.

9. The special names by which the twelve pairs of nerves are generally known are: 1. Olfactory. 2. Optic. 3. Motor oculi. 4. Trochlear or pathetic. 5. Trifacial. 6. Abducens. 7. Facial. 8. Auditory. 9. Glossopharyngeal. 10. Pneumogastric or Vagus. 11. Spinal accessory. 12. Hypoglossal.

PHYSIOLOGY.

1. The sixth (abducens) nerve is the motor nerve to the external rectus muscle of the eye.

3. The normal constituents of the urine are: Water, urea, uric acid, urates, hippuric acid, kreatinin, xanthin, hypoxanthin; sulphates, chlorides, and phosphates of sodium and potassium; phosphates of magnesium and calcium; nitrogen and carbon dioxide.

5. The secretions of the alimentary canal are: Saliva, gastric juice, pancreatic juice, bile, and succus entericus.

The functions of the saliva are: (1) To moisten the mouth, (2) to assist in the solution of the soluble portions of the food, and thus (3) to administer to the sense of taste, (4) to lubricate the bolus of food, and thus (5) to facilitate the acts of mastication and deglutition, and (6) to change starches into dextrin and sugar.

The functions of the gastric juice are: (1) To change

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proteids into proteoses and peptones, and (2) to curdle the casein of milk.

The functions of the pancreatic juice are: (1) To change proteids into proteoses and peptones, and afterwards decompose them into leucin and tyrosin; (2) to convert starch into maltose; (3) to emulsify and saponify fats; and (4) to cause milk to curdle.

The functions of the bile are: (1) To assist in the emulsification and saponification of fats; (2) to aid in the absorption of fats; (3) to stimulate the cells of the intestine to increased secretory activity, and so promote peristalsis, and at the same time tend to keep the feces moist; (4) to eliminate waste products of metabolism, such as lecithin and cholesterin; (5) it has a slight action in converting starch into sugar; (6) it neutralizes the acid chyme from the stomach and thus inhibits peptic digestion; (7) it has a very feeble antiseptic action.

The functions of the succus entericus are: The secretion of enterokinase, secretin, and erepsin, which assist the pancreatic juice in digestion.

6. *The functions of the spinal cord* are: (1) The conduction of nerve impulses; (2) reflex action; (3) co-ordination; it also contains special centers which preside over definite functions.

7. *Amyloid foods* are foods containing amyloses or starches. They contain no nitrogen, but are made up of carbon, oxygen, and hydrogen; the hydrogen and oxygen are in the proper proportions to form water. *Example*: Potatoes.

Proteid foods are foods containing proteids. They contain nitrogen, and have a composition similar to that of albumin; other elements contained in them are carbon, hydrogen, oxygen, and sometimes sulphur. *Example*: Meat.

8. *Experiments to prove the glycogenic function of the liver* were made by Claude Bernard. "He fed a dog for seven days with food containing a large quantity of sugar and starch; and, as might be expected, found sugar in both the portal and hepatic blood. But when the dog was fed with meat only, sugar was still found in the blood of the hepatic veins. Repeated experiments gave invariably the same result. No excess of sugar was found in the portal vein under a meat diet, if care was taken to prevent reflux of blood from the hepatic venous system. Bernard found sugar also in the substance of the liver. It thus seemed certain that the liver formed sugar even when, from the absence of saccharine and amyloid matters in the food, none could be brought directly to it from the stomach or intestines. He subsequently found that a liver removed from the body, and from which all sugar had been com-

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pletely washed away by injecting a stream of water through its blood-vessels, contained sugar in abundance after the lapse of a few hours. This post-mortem production of sugar was a fact which could only be explained on the supposition that the liver contained a substance readily convertible into sugar." (Kirkes' *Physiology*.)

9. *The function of the dura* is protection: Of the *arachnoid*, lymph supply; of the *pia*, blood supply and nutrition.

MATERIA MEDICA AND THERAPEUTICS.

1. *A decoction* is a liquid preparation made by boiling a vegetable substance with water.

An infusion is a liquid preparation made by heating a vegetable substance with hot or cold water; it is not boiled, though boiling water may be used.

A mixture is a liquid preparation, containing one or more insoluble substances in suspension.

An emulsion is a liquid fat in a state of fine and permanent subdivision and suspension in a watery fluid.

2. *The therapeutic uses of purgatives* are: (1) In cases of habitual constipation; (2) to reduce the general blood pressure, for example, in cerebral hemorrhage; (3) to remove the irritant in cases of diarrhea; (4) to aid intestinal antiseptics; (5) to remove toxic products; (6) to remove fluid from the body in various dropsical conditions.

5. "Though decidedly injurious in health, in disease alcohol is a most valuable remedy in appropriate cases. In vomiting of yellow fever, seasickness, etc., iced champagne is useful. *Atonic indigestion* of nervous and depressed subjects, cautiously. *Phthisis*, it does good if it promotes digestion and assimilation; otherwise it is very injurious. *Cholera infantum, diarrhea, etc.*, Cognac brandy in full doses. *Cardiac failure*, brandy in small doses repeated as fast as oxidized. *Chloroform anesthesia*, $\frac{3}{4}$ j-ij of whiskey beforehand, to sustain the heart, and prolong the chloroform narcosis. *Poisoning* by cardiac depressants and snake venom, alcohol freely, to sustain the heart. In *snake poisoning* it is given *ad libitum*. *Diphtheria*, whiskey or brandy in small doses frequently from the commencement, and dilute alcohol sprayed into the throat, is very efficient treatment. *Adynamic fevers*, small doses frequently are often of great value. *Gonorrhea*, Niemeyer is said to have done a lucrative business by treating this affection with injections of tannic acid in port wine. *Insomnia* from cerebral anemia may be prevented by small doses of some alcoholic stimulant at bedtime. *Wounds*, no better dressing than strong alcohol, to prevent putrefaction and protect the surface by coating it with a coagulum of its own

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albumin. *Bed sores* if threatening, alcohol locally, to harden the tissue. *Cold* from exposure, may be prevented by a moderate dose of alcohol, to restore the balance of the circulation and prevent internal congestion, by relaxing the vessels of the periphery." (Potter's *Materia Medica*.)

6. Pulvis opii, gr. j; extractum opii, gr. ss; pulvis ipecacuanhæ et opii, gr. vij ss; acetum opii, ℥viii; tinctura opii, ℥viii; tinctura opii camphorata, ℥ij; tinctura opii deodorata, ℥viii; tinctura ipecacuanhæ et opii, ℥viii; vinum opii, ℥viii.

7. Potassium iodide would be useful in the following conditions: Tertiary syphilis, chronic rheumatism, pleurisy, arteriosclerosis, asthma, mercurial poisoning, chronic inflammations, aneurysms.

8. The dose of veratrum viride is gr. ij; of the tincture, ℥xv. A larger dose can be used in puerperal eclampsia.

CHEMISTRY AND TOXICOLOGY.

1. *Calomel* is a heavy, white powder; amorphous; tasteless and odorless; it is insoluble in cold water and in alcohol, and very slightly soluble in boiling water; when exposed to the light it becomes discolored (first yellow, then gray) and partially decomposed; it sublimes without fusing; it is incompatible with the mineral acids, with the alkaline chlorides, bromides, and iodides.

Corrosive Sublimate is heavy, white and crystalline; it has a strong, acrid, styptic taste and is soluble in water, in alcohol and in ether; it is decomposed by exposure to light.

3. Three prescriptions in which a chemical change takes place:

℞. Tincturæ ferri chloridi, ℥xxx.

Syrupi simplicis, ℥ss.

Tincturæ cinchonæ compositæ, q.s. ad ℥jj.

Misce.; et Signa: One teaspoonful three times a day.

℞. Liquoris ferri et ammonii acetatis, ℥j.

Acidi phosphorici diluti, ℥ss.

Syrupi aurantii, q.s. ad ℥iij.

Misce.; et Signa: One teaspoonful three times a day.

℞. Potassii iodidi, ℥iv.

Spiritis ætheris nitrosi, ℥ss.

Syrupi simplicis, ℥j.

Aquæ, q.s. ad ℥iij.

Misce. et Signa: One teaspoonful three times a day.

4. *A mixture* is the product obtained by uniting into a more or less homogeneous whole two or more substances, whether elements or compounds. There is no chemical union, and the amounts of the component parts are not definite.

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A compound is a substance made up of two or more elements, chemically united with each other in definite proportions.

5. *Iron is incompatible with:* Acids, acid salts, tannic and gallic acids, vegetable astringents, alkalies and their carbonates.

Mercury is incompatible:—The chlorides are incompatible with nearly everything.

Alkaloids are incompatible with: Alkalies, alkaline carbonates, iodine, picric and tannic acids.

6. *A vegetable poison:* Aconite.

"The symptoms of poisoning by aconite usually manifest themselves within a few minutes; sometimes are delayed for an hour. There is numbness and tingling, first of the mouth and fauces, later becoming general. There is a sense of dryness and of constriction in the throat. Persistent vomiting usually occurs, but is absent in some cases. There is diminished sensibility, with numbness, great muscular feebleness, giddiness, loss of speech, irregularity and failure of the heart's action. Death may result from shock if a large dose of the alkaloid be taken, but more usually it is by syncope.

"The treatment should be directed to the removal of the unabsorbed poison by the stomach tube, and washing out of the stomach with infusion of tea holding powdered charcoal in suspension. Stimulants should be freely administered." (Witthaus' Essentials of Chemistry.)

7. *A mineral poison:* Lead.

The symptoms of poisoning by lead are: "Metallic taste; dryness of the throat; thirst; severe colicky abdominal pains, referred particularly to the umbilical region, and relieved by pressure; pulse very feeble and slow; great prostration; constipation; urine scanty and red; violent cramps; paralysis of the lower extremities; convulsions, and tetanic spasms."

The treatment consists in removing the cause and administering the antidote, "magnesium sulphate, which brings about the formation of the insoluble lead sulphate, while the purgative action of the magnesia is also useful. It should be preceded by an emetic or by the use of the stomach tube." (Witthaus' Essentials of Chemistry.)

8. *Symptoms in carbolic acid poisoning:* Buccal mucous membrane is whitened and hardened; vomiting; burning pain in mouth, esophagus, and stomach; pulse and body temperature are lowered; the pupils are contracted; collapse, and finally death. The urine may become dark.

Treatment: Emetics, white of egg, stimulants. Alcohol is said to be antidotal.

9. The following symptoms indicate over-absorption of

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carbolic acid from a surgical dressing: The urine becomes of a smoky or greenish or black color, and is apt to contain albumin; the temperature becomes subnormal, the respirations and pulse feeble; this is followed by muscular weakness and vertigo.

10. The *antidotes for opium* are: Potassium permanganate, or tannic acid, strychnine, and caffeine. *For belladonna*: Morphine or tannin. *For digitalis*: Tannic acid and amyl nitrite. *For arsenic*: Freshly prepared solution of ferric hydroxide. *For hemlock*: Tannic acid.

PATHOLOGY.

3. *The causes of edema*: "Six factors enter into the production of edema, usually more than one acting at a time, viz., positive pressure in the vessels (in proportion as it rises), permeability of the vessel wall, osmosis from excess of salts outside the vessel as seen in the action of a saline laxative, selective action of the endothelium, variations in the blood plasma, and obstructed onflow in the lymph channels." (Thayer's *Pathology*.)

BACTERIOLOGY AND HYGIENE.

1. The microorganism that produces the plague is the *Bacillus pestis*.

It is non-motile, with rounded ends, is about $1\frac{1}{2}$ mikrons in length and a little more than half a mikron in breadth; it stains readily with all the anilin dyes, not by Gram's method; it has no spores, and is not encapsulated.

It is chiefly found in the bubo, spleen, liver, and blood of those suffering from the plague.

2. A *pure culture* is one that contains only one kind of microorganism.

To make a pure culture: "All that is necessary is to inoculate the liquefied gelatin with the mixture of bacteria, and after thorough agitation so as to separate each cell from its neighbor, to pour the liquid on to the surface of a sterile plate. The gelatin now solidifies and imprisons, as it were, the separated cells. Each of these now multiplies and reproduces its kind; eventually, in the course of a day or two, a small growth, perhaps of the size of a small pinhead, appears. This is called a colony, and since it is derived from a single cell it constitutes a pure culture. Such is the principle of the dilution method for obtaining pure cultures. The isolation once accomplished, all that is necessary is to transplant the colony to sterile culture media so as to keep up the growth." (*Reference Handbook of the Medical Sciences*.)

3. In *malaria*, the malarial protozoa would be found,

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and the Widal test would be negative. The *Bacillus typhosus* of Eberth would not be found.

In *typhoid* the Widal reaction should be positive; there would be no malarial protozoa present. The *Bacillus typhosus* of Eberth might be found in the feces and urine.

4. Koch's law in regard to the bacterial cause of disease is: (1) The microorganism must be found in the tissues, blood, or secretions of a person or animal sick or dead of the disease; (2) the microorganism must be isolated and cultivated from these same sources; it must also be grown for several generations in artificial culture media; (3) the pure cultures, when thus obtained, must, on inoculation into a healthy and susceptible animal, produce the diseases in question, and (4) the same microorganisms must again be found in the tissues, blood or secretions of the inoculated animal.

5. "The preventive measures which may be taken to reduce tuberculosis may be summarized as follows: (1) The compulsory notification of phthisis. (2) The removal of those conditions of domicile and of occupation which are known to promote the incidence of the disease, including the regulation of certain dusty trades. (3) The diffusion of knowledge (by medical men, leaflets, etc.) regarding the nature and modes of spread of the disease, and the precautions which should be taken in order to prevent its extension. (4) The testing of sputum and other suspected discharges, and of milk, meat, etc., supposed to be tuberculous—reports to be furnished free of charge. (5) Local authorities to undertake, without charge, the disinfection of houses recently occupied by phthisical persons. (6) The establishment of sanatoria and isolation accommodation for the cure of phthisical patients, and the isolation of those who are a distinct source of danger to fellow lodgers or workers. (7) The enforcement of measures against spitting in public conveyances and in places of public resort. (8) The efficient sanitary supervision of dairy farms, dairies, and milkshops. The periodical veterinary inspection and testing (by tuberculin) of milch cows, and the slaughter of tuberculous animals. The prohibition of the sale of milk of cows affected with tuberculosis. (9) The proper inspection of meat in public abattoirs, and the adoption of due precautions for the control of imported meat and milk." (Parkes' *Practical Hygiene*.)

6. Yellow fever is caused by a specific organism not yet isolated. The *Bacillus icteroides* of Sanarelli is supposed by some to be the cause. Whatever the cause, it is conveyed by a mosquito, the *Stegomyia fasciata*.

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The spread of yellow fever can be prevented by the use of screens and mosquito nets, by destroying the mosquitoes in the house by the use of burning sulphur or pyrethrum, by draining the swamps, by remaining indoors during the hours when the mosquitoes are most active.

8. *Four mineral disinfectants:* Bichloride of mercury, biniodide of mercury, nitrate of silver, and potassium permanganate.

Three organic disinfectants: Cresol, creolin, and carbolic acid.

Three gaseous disinfectants: Formaldehyde, sulphur dioxide, and chlorine.

10. The *Bacillus anthracis* is a large, rod-shaped micro-organism, with slightly thickened ends; it is from 5 to 20 mikrons in length, and a little more than one mikron in breadth; it has a tendency to form long threads; it is non-motile and non-flagellated; it is erobic, and stains by all the alkaline aniline dyes and by Gram's method.

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7. *Chronic gastric catarrh* is generally caused by indiscretions in diet, or by mental worry, it may occur at any time of life, and is characterized by pain in the epigastric region, which generally comes on after eating; there is apt to be morning vomiting, the vomitus consisting of mucus with undigested particles of food; there is seldom hemorrhage; the stomach may be enlarged, and examination of the gastric contents shows free HCl diminished or absent, and the digestive ferments diminished.

Gastric ulcer is generally caused by injury or bacteria, is most apt to occur between the ages of twenty and forty-five; after eating there is pain localized in the stomach, vomiting occurs soon after eating, hematemeses is common, there is localized tenderness over the stomach, and examination of the gastric contents show an excess of free HCl.

Gastric cancer does not usually occur before forty years of age, is more common in males, pain is localized and constant, vomiting is copious and occurs some time after eating; the vomitus contains "coffee ground" material; hemorrhages are common; a tumor may be palpated, and examination of the gastric contents shows absence of free HCl and presence of lactic acid; severe anemia and cachexia are also present.

Treatment of gastric ulcer: Rest and a light and easily digested diet are absolutely essential. Rectal feeding may be necessary for a time. Sodium bicarbonate, bismuth subnitrate, silver nitrate and opium are the most frequently

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used drugs. In case of perforation, or when life is threatened by the frequent hemorrhages or when medical treatment is ineffective, a surgical operation should be considered.

10.

PERICARDITIS WITH EFFUSION.

Area of dullness is pear-shaped and the enlargement is chiefly upward.

Dullness may extend to left of apex-beat.

Generally rapid development.

Apex beat is feeble or lost.

The heart sounds are not clearly heard.

DILATATION OF HEART.

Area of dullness is not pear-shaped, and the enlargement is chiefly downward.

Dullness does not extend to left of apex-beat.

Usually slow development.

Apex-beat is generally apparent, and may be powerful.

The heart sounds are generally clearly heard.

Treatment of pericarditis with effusion: Application of small blisters, and the administration of salines and diuretics are indicated. Rest is advisable, also a milk diet. Paracentesis pericardii may be necessary.

SURGERY.

1. *The causes of intestinal obstruction* are: Strangulation through apertures, or by means of bands and contracting adhesions; impaction of foreign bodies or feces; the presence of tumors; volvulus or intussusception; intestinal paralysis; disease in the intestinal walls ultimately narrowing the lumen.

2. *The chief surgical diseases of the groin* are: Hernia (inguinal, femoral, and obturator), aneurysms, tumors, abscesses (psoas, glandular, and from hip disease), cysts, ulcers, sinuses, enlarged glands, undescended testicle, prolapsed ovary.

3. *Wounds are classified*, as:

I. Contused and open wounds.

II. Open wounds may be: Incised, lacerated, contused, punctured, gunshot, or poisoned; also penetrating and perforating.

III. Aseptic and septic.

4. *Agents employed for the production of local anesthesia:* Cocain, eucain, stovain, Schleich's solution, ethyl chloride, ether, rhigolene, ice and salt.

5. *The causes of secondary hemorrhage* are: Septic infection, slipping of a ligature, or some other defect of liga-

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tion, hemophilia, increased blood pressure due to disease or to reaction from shock, diseased condition of the blood-vessels.

6. *Structures divided in the operation for strangulated femoral hernia* are: Skin, superficial fascia, cribriform fascia, crural sheath, septum crurale, subserous areolar tissue, and peritoneum.

7. Amputations are classified in regard to time of operating, as follows:

(1) Primary, which is performed soon after the accident, as soon as the patient reacts from shock and before there is any fever.

(2) Secondary, which is undertaken some time after the injury, when suppuration or bone or joint disease have supervened.

(3) Intermediate, which is performed during the existence of the fever, but before suppuration or bone or joint disease have appeared.

GENITOURINARY DISEASES.

1. In *simple urethritis* the symptoms are neither so severe nor prolonged as in the gonorrheal variety, pus is not always present, and the gonococcus is never present in the discharge.

In *gonorrheal urethritis* the symptoms are more severe, last longer, and gonococci are always present in the discharge.

2. The following is Cornil's *classification of the syphilodermata*:

- | | |
|---------------------------------------|---|
| 1. Erythematous syphilides (roseola). | { Diffused;
Macular;
Papular. |
| | { Small papules (papular or papulo-granular syphilide);
Miliary syphilide; |
| 2. Papular syphilides. | { Conical, lichen-like syphilide;
Large papules (patches of papulo-lenticular syphilide);
Papulo-tuberculous;
Papulo-squamous. |
| | { Varicelliform; |
| 3. Vesicular syphilides. | { Eczemiform;
Herpetiform. |
| | { Acneiform;
Impetiginous; |
| 4. Pustular syphilides. | { Ecthymatous (sometimes superficial and precocious, sometimes late and ulcerated)—
ulcerous ecthyma. |

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5. Bulbous syphilides. { Pemphigus;
Rupia.
6. Gummous and tubercular syphilides.

6 and 9. "The *cornea*, when participating in syphilitic changes, is usually recognized in the victim of inherited disease. There is found, first, slight pericorneal vascularization, in the diffuse form, with one or several centrally situated or marginal opalescent points showing in the cornea. These increase till the whole or a great part of the cornea is involved, producing thus a characteristic opacity limited to the field of the keratitis. With the keratitis of inherited syphilis are often seen the alterations in the color, size, and shape of the permanent incisor teeth, first described by Mr. Jonathan Hutchinson, who regards the permanent upper central incisors as the test-teeth. These are usually vertically and transversely shortened and thinned, with a crescentic notch at the free border, its convexity regarding the root of the tooth. This notching, most conspicuous in childhood, becomes partially obliterated by attrition in later life. The teeth are also often convergent, occasionally separated; in other cases "pegged," and again discolored in shades of a dull brown.

"The punctate form of keratitis is seen both in acquired and in late inherited syphilis. Intracorneal puncta, the size of a pinhead, are then visible, careful observation of which reveals the lack of luster or grayish shade of color of corneal opacities in general." (*Reference Handbook of the Medical Sciences.*)

8. *The complications of a posterior urethritis* may be: Prostatitis, cystitis, pyelitis, epididymitis, inflammation of the vas deferens and of the seminal vesicles, periurethritis, bubo, inflammation of Cowper's glands, peritonitis, gonorrheal rheumatism, gonorrheal conjunctivitis.

10. *The symptoms of Cowperitis* are: Pain, swelling, and a feeling of heaviness and tension in the perineum, all of which are made worse by walking; a small, sensitive tumor can be felt, and there will be considerable constitutional disturbance, such as chill, fever, and malaise; supuration generally occurs, and dysuria is often present.

OBSTETRICS.

1. *Kidney of pregnancy. Etiology:* Renal insufficiency; renal anemia (due to the pressure of the enlarged gravid uterus on the renal vessels, or to tonic contraction of the renal arteries, which, in turn, is caused by the presence in the blood of toxic matter from the fetal circulation).

Symptoms: Albuminuria (with casts), headaches, ver-

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tigo, dullness, lumbar pain, full pulse with increased arterial tension, edema of face and extremities, constipation, tinnitus aurium, nausea, vomiting, and eclampsia.

3. The varieties of mellituria observed in pregnant women are: (1) A physiological glycosuria, and (2) a pathological glycosuria, or true diabetes mellitus.

4. The organ most at fault for the autointoxication of pregnancy is probably the liver, though some observers consider the kidney as chiefly responsible for the condition.

5. Compound presentations occur about once in every 250 cases.

6. The following table (from Dorland) will indicate the diagnosis of a prior pregnancy:

PRIMIPARA.	MULTIPARA.
The fourchet is present.	The fourchet is missing.
The perineum is tense and deep.	The perineum is relaxed and probably torn.
The labia are in apposition.	The vulva is frequently patulous.
The vagina possesses tonicity, and is rough and rugous, with a granular feel.	The vagina is relaxed and smooth.
The cervix is long, soft, and conical; the os is undilated.	The cervix is large, cylindric, short, not so soft, and probably lacerated; the os is patulous.
The abdomen is full, rounded, tense, and resisting to the touch.	The abdominal walls are relaxed and non-resisting to the touch; the skin is loose and wrinkled.
Dark, purplish-red striae appear late in pregnancy.	The striae may be both white and livid, the former being present from the beginning of pregnancy.
The breasts are full, firm, and sensitive to pressure.	The breasts are flabby, pendulous, and non-sensitive to pressure.
The nipples are usually small and undeveloped or even inverted.	The nipples are large and well developed.
Striae are absent upon the breast.	Striae are frequently to be found.

7. The sex of the fetus *in utero* cannot be determined.

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It can be *guessed at*; a fetal heart beat over 140 is supposed to indicate a girl, below 120 a boy.

10. The *absolute indications for cesarean section* are: Extreme pelvic contraction or deformity in which delivery by forceps or version or symphyseotomy is impossible, and in which craniotomy is either impossible or would be more dangerous to the mother; the presence of extreme atresia of the vagina; rupture of the uterus; sudden maternal death.

STATE BOARD EXAMINATION QUESTIONS.

UNIVERSITY OF THE STATE OF NEW YORK.

(Answer any 10 of the questions on each paper, but no more.)

ANATOMY.

1. Give the general characteristics of a vertebra. Describe the atlas.
2. Describe the ligaments of the hip joint.
3. Describe the varieties of muscular fiber and state where each variety is found.
4. Describe the branches of the arch of the aorta.
5. In what part of the body are the azygos veins? What purpose do they serve?
6. Give the anatomical name, the location, the average size, and the average number of the lymphatic glands of the ileum.
7. Describe the course of the fibers in the optic commissure.
8. Give the minute anatomy of the skin.
9. State the position, structure, length, and relations of the esophagus.
10. Give the gross anatomy of the eye.
11. Write a description of the thyroid gland.
12. What organs are wholly or partially retroperitoneal?
13. Give the relations of the stomach. What glands are found in the mucous membrane of the stomach?
14. Describe and locate the appendix vermiformis.
15. Give the course, caliber, relations, and structure of the ureter.

PHYSIOLOGY.

1. Define protoplasm and give the characteristic properties of living protoplasm.
2. Describe the heart sounds and state to what they are due.

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3. Give the average normal temperature and the rate of pulse and of respiration in (a) the infant, (b) the adult, (c) the aged.
4. What digestive changes take place under the influence of saliva and of gastric juice?
5. State the origin and the functions of bile. What is the average quantity of bile secreted in twenty-four hours?
6. Describe the process by which digested food is absorbed.
7. Describe the physical properties of blood and name its constituents.
8. Describe the manner in which the vibrations of the air are transmitted through the auditory apparatus to be interpreted as sound.
9. State the origin of urea in the body. Mention the average amount of urea excreted in twenty-four hours.
10. Describe the physiological mechanism of perspiration.
11. Give the functions of (a) the medulla oblongata, (b) the cerebellum.
12. Give the mechanism of focal accommodation.
13. Describe (a) tonic muscular contraction, (b) clonic muscular contraction.
14. State in detail how the placenta performs its function.
15. Describe the physiological action of the kidney.

HYGIENE AND SANITATION.

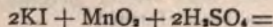
1. Define (a) drainage, (b) sewage, (c) sewerage, (d) humidity, (e) ptomain.
2. In what part of an occupied room is the air most impure? Explain.
3. Explain the difference between hard water and soft water. State how a milk supply may be contaminated by impure water.
4. In what ways do forests benefit public health?
5. Diphtheria and variola are more prevalent in cold weather than in warm weather; explain why this is so. Give hygienic procedure in a case of diphtheria.
6. What methods should be employed for the prevention of yellow fever in the tropics?
7. Describe a procedure of disinfecting and of disposing of typhoid fever stools.
8. Mention some pathogenic bacilli found in drinking water and state what means should be employed to render such water potable.
9. What hygienic measures are advisable for the prevention and eradication of scorbutus?

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10. What evil consequences may arise from the excessive use of tobacco?
11. What means should be employed under public health administration to prevent the spread of tuberculosis?
12. Mention *three* diseases induced by industrial pursuits. Explain how these diseases are caused.
13. Discuss the immunizing power of vaccination. State the possible dangers of vaccination.
14. What influences or conditions probably tend to make cerebrospinal meningitis epidemic? Mention prophylactic measures and describe the supposed causative germ.
15. Mention the various kinds of baths employed in health and in disease, and state the general hygienic rules to be observed in their use.

CHEMISTRY.

1. Define element, ion, specific gravity, reaction, anhydrid.
2. Give the chemical reaction of (a) saliva, (b) gastric juice, (c) urine, (d) mother's milk, (e) synovial fluid.
3. Give the laboratory preparation of O, of CO₂, and of H₂S. Give the properties of *one* of the products mentioned.
4. What is the chemical name of (a) common table salt, (b) soot, (c) vinegar, (d) blue vitriol, (e) Rochelle salt?
5. Give the formula, method of preparation, and principal uses of chloride of lime.
6. Describe a test for biliary acids and their salts.
7. State the changes occurring in the air and in the blood in respiration.
8. Give the formula, uses, and properties of hydrogen dioxide.
9. Give a test for the detection of alum in baking powder.
10. State the source of *each* of the following acids: (a) hydrochloric, (b) sulphuric, (c) lactic, (d) tannic, (e) tartaric.
11. How may carbolic acid be prepared? Mention a chemical antidote for carbolic acid poisoning.
12. Describe (a) a qualitative test for sugar in the urine, (b) a quantitative test for sugar in the urine.
13. What is the action of a solution of permanganate of potassium used as a disinfectant?
14. Give the names and state the formulas of the different compounds used to produce general anesthesia.
15. Complete the following equation:



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SURGERY.

1. Mention the indications for draining a wound, and describe the methods of securing drainage.
2. Define (a) lipoma, (b) angioma, (c) osteoma, (d) myxoma, (e) carcinoma. Give the symptoms of scirrhus carcinoma of the breast.
3. Describe in detail amputation of the forearm.
4. Give the treatment of a compound fracture of the shaft of the tibia.
5. Give the symptoms and the treatment of a forward dislocation of the head of the humerus.
6. Describe the injury received by the various tissues in a severe sprain of the ankle and outline the treatment.
7. What should be the immediate procedure and the subsequent surgical dressing in a case of talipes equinovarus in a newborn infant?
8. Give the surgical treatment of hemorrhage. Describe (a) intravenous saline infusion, (b) hypodermoclysis.
9. Give the symptoms of vesical calculus. Describe a method of proving the presence of a vesical calculus.
10. Describe the preparation necessary for an aseptic laparotomy as regards (a) the patient, (b) the surgeon, (c) the assistants, (d) the instruments, (e) the operating room.
11. Differentiate between fistula and sinus. Describe the surgical treatment of fistula in ano.
12. Mention the most common causes of iritis. Give the symptoms and the surgical treatment of iritis.
13. What conditions render tonsillotomy advisable and how is the operation performed?
14. When should skin grafting be employed? Describe an approved method of skin grafting.
15. Describe in detail the treatment of a scalp wound when a fractured skull is suspected.

OBSTETRICS AND GYNECOLOGY.

1. State the indications for the use of the intrauterine douche and mention the objections to its use.
2. Give the physiological explanation of fecundation.
3. Describe the permanent changes in the female sexual organs following parturition.
4. What are the causes of toxemia of pregnancy? Give the prophylactic management of such a condition.
5. What are the varieties of placenta previa and how should each variety be managed?
6. Under what conditions does version become imperative? How should version be performed?

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7. How is external palpation applied to the diagnosis of the position of the fetus?

8. In the after-coming head, what principles should be applied to secure a living child? How may a dead fetus influence labor?

9. What conditions demand the induction of abortion prior to quickening and what is the technique of the procedure?

10. Give the prognosis and the treatment of a uterine fibroid complicating pregnancy.

11. State the pathology, symptoms, and surgical treatment of endometritis.

12. Differentiate between menorrhagia and metrorrhagia. Give the surgical management of each.

13. Define atresia of the vagina and state the method of relief.

14. Give the etiology and the surgical treatment of erosions of the cervix uteri.

15. Give the causes and the dangers of ophthalmia neonatorum and state the preventive management.

PATHOLOGY AND BACTERIOLOGY.

(Of the ten questions to be answered, select at least four from each group.)

GROUP I.—1. Describe (a) the syphilitic lesions of the skin, (b) the lesions in lupus.

2. What pathological changes in lung tissue occur in the various stages of lobar pneumonia?

3. Describe the changes that occur in the structure of the crystalline lens in cataract.

4. What is leucocytosis and to what conditions may it be due?

5. Describe and illustrate by a drawing or otherwise, the microscopical appearance of an adenoid.

6. Describe the macroscopical and the microscopical appearance of carcinoma of the breast.

7. What pathological conditions are productive of icterus?

8. Describe the changes that occur in degeneration of muscle.

GROUP II.—9. What are the three basic forms of bacteria? Describe each form by drawing or otherwise.

10. Name and describe the microorganism of typhoid fever.

11. Describe the tubercle bacillus. Give a method of microscopical demonstration of the tubercle bacillus.

12. What is a pure culture? Mention *three* of the most useful culture media.

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13. Describe the specific organism of tetanus and state its peculiar culture characteristics.

14. Name and describe a malarial parasite.

15. What is a diplococcus? Give the names of two pathogenic diplococci.

DIAGNOSIS.

1. What vertebræ are directly back of the following points: (a) xiphoid appendix, (b) Ludwig's angle (angulus Ludovici), (c) suprasternal notch?

2. What is the significance of (a) albumin in the urine, (b) casts in the urine?

3. Make a differential diagnosis of the sore throat of diphtheria, scarlatina, and acute tonsillitis.

4. What are the symptoms of incipient tuberculosis? With what other conditions may incipient tuberculosis be confounded?

5. Give the normal boundaries of cardiac dullness. What conditions may increase the area of cardiac dullness?

6. Describe the stools in (a) enteritis, (b) dysentery.

7. What is the significance of (a) bronchial breathing, (b) crepitant râles, (c) vesicular breathing?

8. Make a differential diagnosis of gastric ulcer, cancer of the stomach, and stenosis of the pyloric end of the stomach.

9. What is the incubation period of (a) rubeola, (b) parotitis, (c) variola, (d) varicella, (e) scarlatina?

10. Describe an attack of hepatic colic due to biliary calculi.

11. Give the topography of the valves of the heart on the chest wall. Where is a mitral obstructive murmur heard loudest?

12. Give the clinical signs of pus formation and retention.

13. What are the diagnostic features of tabes dorsalis?

14. Give an estimate of the value of the x-ray as an aid to diagnosis.

15. State the diagnostic value of a blood examination in (a) chlorosis, (b) appendicitis, (c) trichinosis.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

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ANATOMY.

5. The azygos veins are found in the abdominal and thoracic cavities. They serve as a connecting link be-

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tween the superior and inferior venæ cavæ, and also collect blood from the intercostal spaces.

PHYSIOLOGY.

1. Protoplasm is a jelly-like substance which is the physical basis of life.

The characteristic *properties* of living protoplasm are: (1) irritability, or power of responding to a stimulus; (2) power of movement; (3) power of assimilation; (4) power of growth; (5) power of excretion, and (6) power of reproduction.

2. The *causes* producing the *first* sound of the heart are not definitely ascertained. The following are supposed to be causatory factors: (1) The vibration and closure of the auriculo-ventricular valves, (2) the muscular sound produced by the contraction of the ventricles, and (3) the cardiac impulse against the chest wall.

The *second* sound is caused by the vibration due to the closure of the semilunar valves.

3.—

Average normal:—	In Infant	In Adult	In Aged
Temperature.....	About 37.4° C.	About 37.1° C.	About 37.4° C.
Rate of Pulse.....	" 120 a min.	" 72 a min.	" 80 a min.
Rate of Respiration..	" 40	" 16	" 18

4. The *saliva*, by means of the *ptyalin*, converts starches into dextrin and maltose.

The gastric juice, by means of the *pepsin*, converts proteids into proteoses and peptones; the casein of milk is also curdled.

5. Bile is a secretion product of the liver.

The *functions of the bile* are: (1) To assist in the emulsification and saponification of fats; (2) to aid in the absorption of fats; (3) to stimulate the cells of the intestine to increased secretory activity, and so promote peristalsis, and at the same time it tends to keep the feces moist (4) to eliminate waste products of metabolism, such as lecithin and cholesterol; (5) it has a slight action in converting starch into sugar; (6) it neutralizes the acid chyme from the stomach and thus inhibits peptic digestion; (7) it has a very feeble antiseptic action.

The average quantity of bile secreted in twenty-four hours varies from about 500 c.c. to 900 c.c.

7. The *physical properties of blood*: Fluid, somewhat viscid, red, specific gravity from 1055 to 1062, alkaline reac-

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tion, saltish taste, characteristic odor, variable temperature (average about 100 degrees F.).

The *constituents of the blood* are plasma and corpuscles. The *plasma* consists of water and solids (proteids, extractives and inorganic salts). The *red corpuscles* consist of water and solids (hemoglobin, proteids, fat, and inorganic salts). The *white corpuscles* consist of water and solids (proteid, leuconuclein, lecithin, histon, etc.).

8. "The waves of sound are gathered together by the pinna and external auditory meatus, and conveyed to the membrana tympani. This membrane, made tense or lax by the action of the tensor tympani and laxator tympani muscles, is enabled to receive sound waves of either high or low pitch. The vibrations are conducted across the middle ear by a chain of bones to the foramen ovale, and by the column of air of the tympanum to the foramen rotundum, which is closed by the second membrana tympani, the pressure of the air in the tympanum being regulated by the Eustachian tube. The internal ear finally receives the vibrations, which excite vibrations successively in the perilymph, the walls of the membranous labyrinth, the endolymph, and, lastly, the terminal filaments of the auditory nerve, by which they are conveyed to the brain."—(Brubaker's *Physiology*.)

9. *Urea* is derived from the nitrogenous food ingested; it is manufactured by the cells of the liver. The average amount of urea excreted in twenty-four hours is about five hundred grains.

11. (a) *The functions of the medulla* are: (1) It is a conductor of nervous impulses or impressions from the cord to the cerebrum, from the brain to the spinal cord, also of co-ordinating impulses from the cerebellum to the cord; (2) it contains collections of gray matter which serve as special nerve centers for the following functions or actions: Respiration, salivary secretion, mastication, sucking, deglutition, speech production, facial expression; it also contains the cardiac and vasomotor centers.

(b) *The functions of the cerebellum* are: (1) co-ordination, (2) equilibrium.

12. *"Mechanism of Accommodation.*—The lens is an elastic structure, and when released from the flattening influence of its suspensory ligament tends to assume a spherical shape. During accommodation the ciliary muscle (especially the circular fibers) contracts, drawing forward the chorioid and relaxing the suspensory ligament; this diminishes the tension of the lens capsule and allows the inherent elasticity of the lens to increase its convexity. The change in curvature affects chiefly the anterior sur-

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face of the lens. This is Helmholtz's theory and the one usually accepted. Lately Tscherning has advanced a different theory; he maintains that the ciliary muscle increases the tension of the suspensory ligament during contraction and that this causes peripheral flattening of the lens with bulging anteriorly at its center. The act of accommodation is accompanied by contraction of the pupil, and (in binocular vision) by convergence of the visual lines." (May's *Diseases of the Eye*.)

13. In *tonic* muscular contraction the muscle remains for some time in a state of rigid contraction. In *clonic* contraction the muscle alternately contracts and relaxes.

14. "For the purposes of understanding its general functions it is sufficient to recall that the placenta consists essentially of vascular chorionic papillæ from the fetus bathed in large blood-spaces in the decidual membrane of the mother. The fetal and the maternal blood do not come into actual contact; they are separated from each other by the walls of the fetal blood-vessels and the epithelial layers of the chorionic villi, but an active diffusion relation is set up between them. Nutritive material, proteid, fat, and carbohydrate and oxygen pass from the maternal to the fetal blood, and the waste products of fetal metabolism—carbon dioxide, nitrogenous wastes, etc.—pass from the fetal to the maternal blood. . . . We are far from having data that would justify us in supposing that the exchange between the two bloods is effected by the known physical processes of osmosis, diffusion, and filtration. . . . It is generally assumed that the chorionic villi play an active part in the process." (Howell's *Text-book of Physiology*.)

HYGIENE AND SANITATION.

1. (a) *Drainage* is the removal of the surface water and soil water.

(b) *Sewage* is the matter found in sewers, and consists chiefly of excreta and the waste matter from kitchens.

(c) *Sewerage* is the process of systematically collecting and removing sewage from houses or other buildings; also the system of pipes, etc., arranged for the carrying off of sewage.

(d) *Humidity* is the degree of water vapor in the air.

(e) *Ptomain* is a basic compound, containing nitrogen, and produced by bacteria during the putrefaction of animal or vegetable matter.

2. The foulest air will be found nearest the ceiling; there is a tendency for the used air to rise.

3. *Hard* water forms a curdy deposit with soap and

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contains an excess of calcium and magnesium salts; *soft* water allows soap to dissolve in it without precipitation.

A milk supply may be contaminated by impure water, by being adulterated with it; by the cans, containers, or cows' udders being washed with it.

5. Ventilation is less satisfactory and the changes in temperature are greater and more frequent in the cold weather; hence vitality is lowered and there is a greater liability to take diseases.

6. To prevent yellow fever in the tropics: All cases of the disease should be isolated; houses should be protected by mosquito netting; mosquitos should be killed; swamps should be drained.

8. *Some pathogenic bacteria found in drinking water* are: Eberth's bacillus of typhoid, Koch's comma bacillus of cholera, *Bacillus anthracis*, *Staphylococcus pyogenes aureus*, *Streptococcus pyogenes*.

To render such water potable: Boil the water and filter it. The best safeguard by the latter method is to use the Pasteur-Chamberland filter or some other porcelain filter.

9. "Abundant fresh air and sunlight and a diet of fresh vegetables, especially potatoes, spinach, and fruits, with meat, eggs, fish, etc. If the stomach is irritable fresh milk, eggs, and lime, orange or lemon juice may almost always be tolerated. * * * A mouth wash of saturated boric acid, alternating with a 2 per cent. solution of potassium permanganate, should be used every hour or two until the gums are healed." (From Thompson's *Practical Medicine*.)

10. "The continued use of tobacco, by smoking or chewing it to excess, produces granular inflammation of the fauces and pharynx, atrophy of the retina, dyspepsia, lowered sexual power, sudden faints, nervous depression, cardiac irritability, and occasionally angina pectoris. Used by the young, it hinders the development of the higher nerve centers and impairs the nutrition of the body by interfering with processes of digestion and assimilation. It has been credited with causing cancer of the lips and tongue, blunting the moral sense, mental aberration and even insanity." (Potter's *Materia Medica*, etc.)

11. "The preventive measures which may be taken to reduce tuberculosis may be summarized as follows: (1) The compulsory notification of phthisis. (2) The removal of those conditions of domicile and of occupation which are known to promote the incidence of the disease, including the regulation of certain dusty trades. (3) The diffusion of knowledge (by medical men, leaflets, etc.) regarding the nature and modes of spread of the disease,

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and the precautions which should be taken in order to prevent its extension. (4) The testing of sputum and other suspected discharges, and of milk, meat, etc., supposed to be tuberculous—reports to be furnished free of charge. (5) Local authorities to undertake, without charge, the disinfection of houses recently occupied by phthisical persons. (6) The establishment of sanatoria and isolation accommodation for the cure of phthisical patients, and the isolation of those who are a distinct source of danger to fellow lodgers or workers. (7) The enforcement of measures against spitting in public conveyances and in places of public resort. (8) The efficient sanitary supervision of dairy farms, dairies, and milkshops. The periodical veterinary inspection and testing (by tuberculin) of milch cows, and the slaughter of tuberculous animals. The prohibition of the sale of milk of cows affected with tuberculosis. (9) The proper inspection of meat in public abattoirs, and the adoption of due precautions for the control of imported meat and milk." (Parkes' *Practical Hygiene*.)

CHEMISTRY.

1. An *element* is a substance which cannot, by any known means, be split up into dissimilar substances.

An *ion* is the primary product of electrolysis.

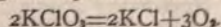
Specific gravity of a substance is the weight of a given volume of that substance as compared with the weight of an equal volume of some other substance taken as a standard of comparison, under like conditions of temperature and pressure.

Reaction has two meanings: (1) It is the mutual chemical action of two substances upon each other. (2) It is the action of substances upon certain organic pigments.

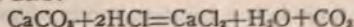
An *anhydrid* is an oxide capable of combining with water to form an acid.

2. The chemical reaction of (a) saliva, is alkaline; (b) gastric juice, is acid; (c) urine, is acid; (d) mother's milk, is alkaline; (e) synovial fluid, is alkaline.

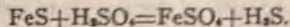
3. O is prepared by heating a mixture of equal parts of potassium chlorate and manganese dioxide. The potassium chlorate gives up all of its O:



CO₂ is prepared by acting on calcium carbonate with hydrochloric acid:



H₂S is prepared by acting on ferrous sulphide with dilute sulphuric acid:

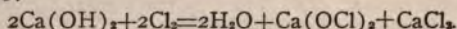


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The *properties of oxygen*: It is a colorless, odorless, tasteless gas; it is sparingly soluble in water; it has a strong tendency to enter into combination with other elements; it is necessary for respiration, and is both combustible and a supporter of combustion.

4. The chemical name of (a) common table salt, is sodium chloride; (b) soot, is carbon; (c) vinegar, is acetic acid; (d) blue vitriol, is cupric sulphate; (e) Rochelle salt, is potassium sodium tartrate.

5. CHLORIDE OF LIME. *Formula*: $\text{Ca}(\text{OCl})_2 + \text{CaCl}_2$. *Preparation*: It is made by treating slaked lime with chlorine:



Principal uses: As a disinfectant and for bleaching.

6. *The Pettenkofer test*: Dissolve one or two drops of a solution of cane sugar 1:4 in the liquid to be examined; shake the mixture and float it carefully upon concentrated H_2SO_4 . In the presence of bile acids the solution becomes turbid at the zone of junction of the two layers; this is soon replaced by a deep reddish purple zone, which extends upward and downward.

7. Changes occurring in the *air* is respiration:

	Expired Air.	Inspired Air.
Oxygen	16.6 per cent.	21 per cent.
Nitrogen	79 per cent.	79 per cent.
Carbon dioxide ...	4.4 per cent.	0.04 per cent.
Other gases.....	Often present.	Rare.
Watery vapor.....	Saturated.	Variable.
Temperature	That of body.	Variable.
Volume	Diminished.	Varies.
Bacteria	None.	Always present.
Dust	None.	Always present.

Changes occurring in the *blood* in respiration: Respiration renders the blood red in color, warmer, adds oxygen and takes away carbon dioxide, makes it more coagulable and of more uniform composition.

8. HYDROGEN DIOXIDE. *Formula*: H_2O_2 .

Uses: It is used as a disinfectant, as an oxidizing agent, as an antiseptic, for bleaching, and for renovating old oil paintings.

Properties: It is a colorless, syrupy liquid, heavier than water, and having a metallic taste.

9. "Alum is tested for (in baking powder) by burning a small quantity of the sample to an ash, which is then

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treated with boiling water and filtered. If on the addition of ammonium chloride to the filtrate a flocculent precipitate is formed, this will indicate the presence of alum in the sample." (*Reference Handbook of the Medical Sciences.*)

10. The source of (a) *hydrochloric acid*: The fumes produced by the action of H_2SO_4 on $NaCl$ are dissolved in H_2O .

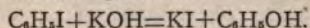
(b) *Sulphuric acid*: It is produced by the combustion of S and the oxidation and hydration of the resulting SO_2 by means of HNO_3 .

(c) *Lactic acid*: It is produced by the lactic fermentation of milk-sugar.

(d) *Tannic acid*: From nutgalls.

(e) *Tartaric acid*: From the juice of the grape.

11. *Carbolic acid* may be prepared by heating phenyl iodide with potassium hydroxide:



Chemical antidotes for carbolic acid poisoning are the soluble sulphates, such as sodium sulphate or magnesium sulphate.

12. "(a) *Qualitative test for sugar in the urine*: Render the urine strongly alkaline by addition of Na_2CO_3 . Divide about 6 c.c. of the alkaline liquid in two test tubes. To one test tube add a very minute quantity of powdered subnitrate of bismuth, to the other as much powdered litharge. Boil the contents of both tubes. The presence of glucose is indicated by a dark or black color of the bismuth powder, the litharge retaining its natural color." (*Witthaus' Essentials of Chemistry.*)

(b) Method for the quantitative estimation of sugar in urine: *Fehling's method*: The solution is made as follows:

- | | |
|---|-------------|
| I. Dissolve cupric sulphate | 51.98 gm. |
| in water to | 500.00 c.c. |
| II. Dissolve Rochelle salt | 259.9 gm. |
| in sodium hydroxide soln. sp. gr. 1.12 to 1,000 c.c. (Piffard). | |

When required for use, one volume of I. is to be mixed with two volumes of II. The copper contained in 10 c.c. of this mixture is precipitated completely, as cuprous oxide, by 0.05 gm. of glucose.

"To determine the quantity of sugar, place 10 c.c. of the mixed soln. in a flask of about 250 c.c. capacity, dilute with H_2O to about 30 c.c., and heat to boiling. On the other hand, the urine to be tested is diluted and thoroughly mixed with four volumes of H_2O if it be poor in sugar, or

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with nine volumes of H_2O if highly saccharine, and a burette filled with the mixture. When the Fehling soln. boils, add a few gtt. NH_4HO and then 5 c.c. of the urine from the burette, boil again, and continue the alternate addition of diluted urine and boiling of the mixture until the blue color is quite faint. Now add the diluted urine in quantities of 1 c.c. at a time, boiling after each addition until the blue color just disappears. Have ready a small filter, and, having filtered through it a few gtt. of the hot mixture, acidulate the filtrate with acetic acid, and add to it 1 gtt. soln. of potassium ferrocyanide. If a brownish tinge be produced, add another $\frac{1}{2}$ c.c. of dil. urine to the flask, boil, and test with ferrocyanide as before. Continue this proceeding until no brown tinge is produced. The burette reading, taken at this point, gives the number of c.c. of dilute urine containing 0.05 gm. glucose, and this divided by 5 or 10, according as the urine was diluted with 4 or 9 volumes of H_2O , gives the number of c.c. of urine containing 0.05 gm. sugar. The number of c.c. urine passed in twenty-four hours divided by 20 times the number of c.c. containing 0.05 gm. glucose, gives the elimination of glucose in twenty-four hours in grams.

Example: Urine in 24 hours	= 2,436 c.c.
Fehling's soln. used	= 10 c.c.
Urine diluted with 4 vols. H_2O	
Burette reading	= 18.5 c.c.

$$\frac{18.5}{5} = 3.7 = \text{c.c. urine containing 0.05 gm. glucose.}$$

$$\frac{2,436}{3.7 \times 20} = 32.92 = \text{grams glucose eliminated in 24 hours.}$$

(Witthaus' *Urinalysis*.)

13. Potassium permanganate acts as a disinfectant by oxidizing the organic matter with which it comes in contact.

14. The chief general anesthetics, with their formulæ, are: Chloroform, $CHCl_3$; ether $(C_2H_5)_2O$; nitrous oxide, N_2O ; ethyl chloride, C_2H_5Cl .

15. $2KI + MnO_2 + 2H_2SO_4 = K_2SO_4 + MnSO_4 + 2H_2O + I_2$.

PATHOLOGY AND BACTERIOLOGY.

3. "Senile cataract results from shrinkage of the nucleus, together with the lens fibers, and presence of fluid in the spaces thus created. The lens fibers then swell, become cloudy, and disintegrate. The nucleus usually remains unchanged." (May's *Diseases of the Eye*.)

4. *Leucocytosis* is an increase in the number of leucocytes in the peripheral blood.

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It may be due to inflammations, hemorrhage, various infections, certain toxic conditions. It is also found physiologically or normally: During digestion, during pregnancy, after parturition, after violent exercise, massage, and in the new-born child.

7. *Icterus* may be caused by: Certain poisons, infections, pernicious anemia, pronounced degeneration of the liver cells, obstruction of the bile duct, catarrh of the bile ducts, parasites or other foreign bodies in the bile ducts, and the pressure of tumors in adjacent parts.

9. The three basic forms of bacteria are: (1) The *coccus*, which is round or oval, and may appear singly, in pairs, in groups of four, in chains, or in bunches. (2) The *bacillus*, which is rod shaped, with the longer sides parallel, and the short ends either straight, rounded, or concave. (3) The *spirillum*, which is spiral.

10. Typhoid fever is caused by the *Bacillus typhosus* of Eberth. This organism is rod shaped, with rounded ends, is from 2 to 4 mikrons in length, and about three-fourths of a mikron in breadth; it does not stain by Gram's method, but stains with all the anilin dyes; it has flagella, no spores, is aerobic and facultative anaerobic, and is motile.

11. The tubercle bacillus is rod shaped, is from $1\frac{1}{2}$ to $3\frac{1}{2}$ mikrons in length and about one-third to one-half a mikron in breadth, is a strict parasite, is not motile and has no flagella.

To demonstrate the existence of tubercle bacilli in the sputum: The sputum must be recent, free from particles of food or other foreign matter; select a cheesy-looking nodule and smear it on a slide, making the smear as thin as possible. Then cover it with some carbolfuchsin, and let it steam over a small flame for about two minutes, care being taken that it does not boil. Wash it thoroughly in water and then decolorize by immersing it in a solution of any dilute mineral acid for about a minute. Then make a contrast stain with solution of Loeffler's methylene blue for about a minute; wash it again and examine with oil immersion lens. The tubercle bacilli will appear as thin red rods, while all other bacteria will appear blue.

12. A pure culture is a culture in which only one micro-organism is present.

Three-culture media: Bouillon made from beef extract, gelatin, and agar.

13. The bacillus of tetanus is characterized by its peculiar spore, formed at one end of the bacillus, and giving it the appearance of a pin; it is purely anaerobic, and cannot

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be developed at all in the presence of oxygen. It generally comes from the soil, and is found in penetrating wounds. It appears in two forms, the spore-bearing form, as described above, and the vegetative form, which is a short bacillus with rounded ends, and which may occur singly or in pairs, or may form long filaments. It grows in gelatin stab cultures in the middle of the medium, and the colonies look something like a fir tree; its growth is slow, and a disagreeable odor is at the same time emitted. In bouillon, it grows near the bottom of the tube, and produces gases.

15. A *diplococcus* is a form of bacteria made up of two cocci attached to each other (in pairs).

Two pathogenic diplococci: *Diplococcus pneumoniae* and *Diplococcus intracellularis meningitidis*.

DIAGNOSIS.

1. The vertebra directly back (a) of *xiphoid appendix*, is the tenth dorsal; (b) of *Ludwig's angle*, is the third dorsal; (c) of *suprasternal notch*, is second dorsal.

2. (a) *Albumin* is found in the urine: "(1) In fevers, as typhoid and pneumonia. (2) In valvular heart lesions, degeneration of the heart muscles, diseases of the coronary arteries, impeded pulmonary circulation, in pregnancy by pressure upon the renal veins, in intestinal catarrh, and in Asiatic cholera. (3) In purpura, scurvy, leukemia, pernicious anemia, jaundice, diabetes, and syphilis. (4) After taking lead, mercury, iodine, phosphorus, arsenic, antimony, chloroform, cantharides, oxalic, carbolic, salicylic or the mineral acids, turpentine and nitrates. (5) In large amounts in acute nephritis and chronic parenchymatous nephritis; in small amounts in chronic interstitial nephritis and amyloid kidney." (Witthaus' *Essentials of Chemistry*.)

(b) "*Casts* in the urine occur in nephritis; and different varieties are found in the different forms of that disease. *Hyaline* casts occur in all forms of nephritis, in congestion of the kidneys, in jaundice, and even in health. *Waxy* casts occur especially in chronic parenchymatous nephritis. *Epithelial* casts occur especially in acute parenchymatous nephritis. *Granular* casts are especially common in chronic nephritis, but they may occur in acute nephritis. *Fatty* casts occur chiefly in chronic parenchymatous nephritis. *Blood* casts occur in acute and chronic hemorrhagic nephritis. *Pus* and *bacterial* casts are occasionally met with in suppurative nephritis." (From Stevens' *Practice of Medicine*.)

3. "In *diphtheria* the palate, fauces, or pharynx are of a vivid red color, coated in parts with a thick grayish white

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exudation, which, when peeled off, leaves the subjacent membrane red and bleeding, and is soon renewed. In *scarlatina* the throat may be inflamed, but not ulcerated, or both inflamed and ulcerated, or with both these conditions and accompanied with sloughing. In *acute tonsillitis* the pain is augmented by swallowing, the affected tonsil is swollen, and projects towards the middle line, the mucous membrane is red and covered with mucus." (From Fenwick's *Medical Diagnosis*.)

4. The early manifestations of pulmonary tuberculosis are: (1) *Physical signs*: Deficient chest expansion, the phthisical chest, slight dullness or impaired resonance over one apex, fine moist râles at end of inspiration, expiration prolonged or high pitched, breathing interrupted. (2) *Symptoms*: General weakness, lassitude, dyspnea on exertion, pallor, anorexia, loss of weight, hemoptysis, slight fever, and night sweats.

Incipient tuberculosis may be confounded with typhoid, malaria, and capillary bronchitis.

5. The normal boundaries of absolute cardiac dullness are: (1) A line drawn from the center of the sternum, on a level with the fourth costal cartilages, to the apex of the heart; (2) a line from the same point down the left edge of the sternum; (3) a line joining the ends of (1) and (2).

The area of cardiac dullness is *increased* in: Hypertrophy of the heart, dilatation of the heart, pericardial effusion.

6. (a) In *enteritis* the stools are generally thin and watery, but may be pultaceous; the color varies according to the quantity of bile present; undigested food, mucus, epithelium, and microorganisms of various sorts are present.

(b) In *dysentery* the stools contain mucus and blood, are accompanied with much tenesmus and pain; are very small and frequent, sometimes being passed every few minutes; contain little fecal matter; contain the *Ameba dysenteria* or Shiga's bacillus.

7. (a) *Bronchial breathing* may indicate consolidation of the lung, or a large cavity communicating with a bronchus; it is heard in phthisis, lobar pneumonia, and hemorrhagic infarction; it is also heard normally over the trachea and large bronchi.

(b) *Crepitant râles* may indicate the first stage of lobar pneumonia, or pulmonary edema and atelectasis.

(c) *Vesicular breathing* may be "compensatory" when the other lung is out of use; it may indicate emphysema, bronchitis, phthisis, defective lung expansion, pleuritic ef-

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fusion; it is also heard normally over a large portion of the chest.

8. *Gastric ulcer* is generally caused by injury or bacteria; is most apt to occur between the ages of twenty and forty-five; after eating there is pain localized in the stomach, vomiting occurs soon after eating; hematemesis is common, there is localized tenderness over the stomach, and examination shows an excess of free HCl.

Cancer of the stomach does not usually occur before forty years of age, is more common in males, the pain is localized and constant, vomiting is copious and occurs some time after eating; the vomitus contains "coffee ground" material; hemorrhages are common; a tumor may be palpated, and examination of the gastric contents shows absence of free HCl and presence of lactic acid; severe anemia and cachexia are also present.

In *stenosis of the pyloric end of the stomach* there will be found a distended stomach; there is vomiting at long intervals, the vomitus being copious and consisting of stagnant fluid with undigested particles of food; the *Sarcina ventriculi* and many bacteria may be present.

11. *Topography of the valves of the heart on the chest wall*: "The *right auriculo-ventricular valves* are situated behind the sternum above the level of the fourth costal cartilage; the *left auriculo-ventricular valves* are opposite the third intercostal space, about one inch to the left of the sternum; the cusps of these valves extend as low as the fifth costal cartilage. The *pulmonary valves* lie immediately behind the junction of the third left costal cartilage with the sternum; the *aortic valves* are behind the upper border of the third intercostal space just at the left side of the sternum." (Holden.)

A mitral obstructive murmur is loudest at the apex.

15. (a) In *chlorosis* a blood examination shows marked diminution of hemoglobin, slight diminution of red cells, poikilocytosis, and in severe cases nucleated red cells. The diagnosis is certain.

(b) In *appendicitis* leucocytosis is fairly constant, except in the mildest and most severe cases. The blood examination will differentiate this condition from typhoid. It is a help in diagnosis, but not absolutely certain.

(c) In *trichinosis* there is a leucocytosis with a very pronounced eosinophilia. It is of great diagnostic value.

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STATE BOARD EXAMINATION QUESTIONS.

NORTH CAROLINA BOARD OF MEDICAL EXAMINERS.

CHEMISTRY AND DISEASES OF CHILDREN.

1. Define an atom. (a) How always found? (b) What is taken as the standard?
2. Define a symbol. (a) Also a coefficient. (b) What does each represent?
3. Define a metal. (a) How many are known? (b) Name the noted exception.
4. What is a thermometer? (a) How is it made? (b) Name standard brands.
5. What is a blood corpuscle? (a) How many kinds? (b) To what is the color due?
6. Define dentition. (a) At what age does it appear? (b) Name some of its disturbances.
7. What is ophthalmia neonatorum? (a) Whence derived? (b) Give treatment.
8. Define exanthematous fever. (a) Name three. (b) What ages are exempt?
9. What is diarrhea? (a) Acute inflammatory. (b) Treatment.
10. Define rachitis. (a) Who is most subject to it? (b) How long do the effects last?

PHYSIOLOGY AND HYGIENE.

1. Describe a complete physiological revolution of the heart; fetal and adult.
2. Give origin of salivary and gastric secretions and function of each.
3. Give function of pancreatic and intestinal secretions.
4. Through what media is the blood relieved of effete material and provided with new?
5. How is the blood current maintained and what arteries carry venous blood?
6. What is the function of the cerebellum?
7. If seventh cranial nerve were incised at its exit from the stylomastoid foramen, state briefly the result.
8. Give function of pneumogastric nerve as related to respiration.
9. Detail uses of the largest gland in the body.
10. What occupations cause a predisposition to pulmonary diseases?

ANATOMY.

1. Describe the pubic or pectineal bone.
2. Name the ligaments of the elbow joint (humerus with ulna and radius).
3. Give the relations of the deep palmar arch.

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4. Name the divisions of fifth (trigeminus) pair of cranial nerves and mention in a general way the parts supplied by each (motor, sensory, etc.).
 5. Give the boundaries of the inguinal canal.
 6. Describe the cecum.
 7. Name the contents of the submaxillary triangle and give its boundaries.
 8. Mention the hepatic fissures, name the structures found in each and the lobes separated by each.
 9. Describe the prostate gland (do not give its relations or its histology).
 10. Name the structures cut in performing a tracheotomy above the isthmus of the thyroid.
- N. B.—Answer only eight questions.

OBSTETRICS AND GYNECOLOGY.

1. Given: Primipara at end of eighth month of pregnancy, considerable edema of the face, feet, and legs, urine scant in quantity, slight cephalalgia, dimness of vision, anemic, weak, short of breath upon slight exertion; (a) give diagnosis; (b) what grave symptom might be expected to follow if patient is not properly treated; (c) briefly outline treatment.
2. During normal labor (a) how and by means of what action is the dilatation of the cervix brought about? (b) What forces are employed in the stage of expulsion?
3. Give diagnostic symptoms of placenta prævia.
4. How would you treat a case of adherent placenta?
5. Prescribe for a case of pruritus vulvæ.
6. Name three causes for which you would curette the uterus, and state in which you would use the dull and in which the sharp curette.
7. In ventral fixation, (a) what organ is fixed, (b) for what purpose is it fixed, (c) to what (anatomically) is it fixed, (d) what kind of sutures should be used?
8. How would you treat a case of congenital atresia of the cervix?

MATERIA MEDICA.

1. Name and describe the methods of introducing medicine into the circulation.
2. Name an example of: (a) An alterative, (b) anti-periodic, (c) antispasmodic, (d) diaphoretic, (e) diuretic.
3. Name the alkaloids of hyoscyamus—doses.
4. What are the uses of the bromides?
5. Name the preparations and doses of arsenic.
6. What is the dose of (a) ol. terebinthinæ, (b) tinct. veratrum viride, (c) Basham's mixture, (d) tincture of aconite, (e) caffeine citrate; (f) sparteine sulphate?

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7. Why is atropine often combined with morphine when the latter is used?
8. Name three drugs most useful in the treatment of intermittent fever.
9. Write a prescription for an adult with bronchitis, containing three ingredients.
10. Criticise the following prescription:
 ℞ Argenti Nitratis.....gr. xx
 Sodi Chloridi1 drachm
 Aqua2 ounces
Sig. I drachm every four hours.

SURGERY.

1. Give symptoms and treatment of anal fissure.
2. Give diagnosis of strangulated hernia.
3. Give differential diagnosis between hydrocele and inguinal hernia.
4. Give diagnostic characteristics of syphilitic skin eruptions.
5. In hemorrhage of superficial palmar arch, which end of the bleeding vessel would you tie?
6. Give etiology of hydronephrosis.
7. Give diagnosis of mastoid disease.
8. Give indications for intubation of larynx.
9. In an injured elbow, what signs would verify fracture of internal condyle?
10. What conditions associated with loss of consciousness must be differentiated from traumatic intracranial lesions.

PRACTICE OF MEDICINE.

1. Give symptoms of diagnostic value in the first and second week of typhoid fever.
2. Give differential diagnosis between primary lobar pneumonia and acute pneumonic phthisis.
3. Give causes and treatment of chronic dysentery.
4. Define leukemia, Addison's disease, myxedema, brachycardia.
5. Give symptoms and signs of aneurysm of the abdominal aorta.
6. Give symptoms of acute intestinal obstruction.
7. Give differential diagnosis between uremia, alcoholic coma, and cerebral hemorrhage.
8. Give definition and etiology of thrombosis in the brain.
9. Write one, and only one, prescription for chronic constipation.
10. Describe the most important symptoms of cerebro-spinal meningitis.

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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

NORTH CAROLINA BOARD OF MEDICAL EXAMINERS.

CHEMISTRY AND DISEASES OF CHILDREN.

1. An *atom* is the smallest quantity of an element that can enter into chemical action, or that can enter into the composition of a molecule.

(a) It is always found in combination with other atoms (either of the same or of different elements).

(b) The weight of an atom of hydrogen is taken as the standard for atomic weights.

2. A *symbol* is a sign by which an atom of an element is represented or expressed in chemical writing. It is generally the first letter or letters of the name of the element in Latin.

(a) A *coefficient* is a number placed before a chemical formula to denote how many times the formula is to be multiplied.

(b) A *symbol represents*:—(1) The name of the element; (2) one atom of the element; (3) the combining weight of the element as compared with hydrogen as unity; and (4) one volume of the element in a gaseous state.

A *coefficient represents* the number of times that the formula is to be multiplied.

3. A *metal* is an element which is capable of replacing part or all of the hydrogen of an acid, to form a salt.

(a) There are between fifty and sixty metals.

(b) Mercury is an exception in that it is not a solid at the ordinary temperature.

4. "Thermometers are instruments for the measurement of temperature. They are usually glass tubes having a bulb blown at one end and closed at the other, the bulb and part of the tube being filled with mercury or with alcohol, whose contraction or expansion indicates a fall or rise of temperature. . . . In every thermometer there are two fixed points, determined by experiment. The lower, or freezing point, is fixed by immersing the instrument in melting ice, and marking the level of the mercury in the tube upon the glass when it has become stationary. The higher, or boiling point, is similarly fixed by suspending the instrument in the steam from boiling water. The instrument is then graduated according to one of three scales: the Celsius, or Centigrade, the Fahrenheit, and the

MEDICAL RECORD.

Réaumur. The freezing point is marked 0° in the Centigrade and Réaumur scales, and 32° in the Fahrenheit. The boiling point is marked 100° in the Centigrade, 212° in the Fahrenheit, and 80° in the Réaumur scale. The space between the fixed points is divided into 100 equal degrees in the Centigrade scale, into 180° in the Fahrenheit, and into 80° in the Réaumur." (Witthaus' *Manual of Chemistry*.)

(b) Standard brands are:—Fahrenheit, Celsius, or Centigrade, and Réaumur.

5. A blood corpuscle is a minute solid body or cell, suspended in the liquor sanguinis.

(a) There are three kinds:—(1) Colored, or red corpuscles, or erythrocytes; (2) colorless, or white corpuscles, or leucocytes; of these there are five varieties: (a) small mononuclear leucocytes, (b) large mononuclear leucocytes, (c) transitionals, (d) polynuclears, and (e) eosinophiles; (3) platelets or plaques.

(b) The color is due to the hemoglobin in the red cells.

6. *Dentition* is the process of teething or "cutting the teeth."

(a) Primary dentition occurs normally between about the sixth and twenty-fourth months; secondary dentition occurs normally between about the sixth and twenty-fourth years.

(b) "The disturbances incident to teething may be divided into:

"1. *Local*.—The gums may be hot, painful, and tender. There may also occur a catarrhal stomatitis, with increased salivary secretions that, by dribbling, excoriate the chin, and may, by wetting the chest, cause a bronchitis.

"2. *Sympathetic or Reflex*.—Any of the following complications may occur: *Eye*: More or less severe inflammation. *Ear*: Catarrhal or purulent otitis media. *Digestive tract*: Gastrointestinal disturbances. *Respiratory tract*: Bronchitis, cough, etc. *Skin*: Erythema, urticaria, eczema. *Nervous system*: Restlessness, disturbed sleep, convulsions." (Gould and Pyle's *Cyclopedia of Medicine and Surgery*.)

7. Ophthalmia neonatorum is an infectious, purulent inflammation of the conjunctiva in the new-born.

(a) It is due to the gonococcus or some other pyogenic germ; and is produced by contact of the eye with the vaginal secretion of the mother during labor, or infected fingers, or instruments, etc.

(b) *Treatment* is:—(1) Prophylactic—whenever there is the possibility of infection, or in every case, wash the eyelids of the new-born child with clean warm water, and

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drop on the cornea of each eye one drop of a one or two per cent. solution of nitrate of silver, immediately after birth. (2) *Remedial*:—Wash the eyes carefully every half hour with a saturated solution of boric acid; pus must not be allowed to accumulate. Two drops of a two per cent. solution of nitrate of silver must also be dropped on to the cornea every night and morning. The eyes must be covered with a light, cold, wet compress. The patient must be isolated, and all cloths and compresses used must be burnt.

8. An *exanthematous fever* is a fever accompanied by an eruption on the skin.

(a) Scarlet fever, measles, smallpox.

(b) As a rule very early infancy and old age are exempt, but there are exceptions.

9. Diarrhea is a symptom of many pathological conditions; it is characterized by the fecal discharges being too frequent or too liquid.

(a) Acute inflammatory diarrhea is the above-named condition when due to some inflammatory process in the intestines.

(b) The treatment consists in withholding all food while the trouble lasts (but water must be given); castor oil or calomel should be given, this can be followed by bismuth subnitrate or chalk mixture. Milk feeding should only be resumed slowly and gradually, and can be preceded by beef juice or veal broth.

10. Rachitis is a constitutional disease of infancy and early childhood, characterized by defective nutrition with its chief manifestations in the growing bones.

(a) The most subject to it are the *artificially fed* children.

(b) The effects last for a variable time, from some months to some years.

PHYSIOLOGY AND HYGIENE.

2. The *salivary secretion* is derived from the salivary glands (parotid, submaxillary, and sublingual).

Its functions are twofold:—I. *Mechanical*:—(1) to moisten the mouth, (2) to assist in the solution of the soluble portions of the food, and thus (3) to administer to the sense of taste, (4) to lubricate the bolus of food, and thus (5) to facilitate the acts of mastication and deglutition.

II. *Chemical*:—See Question 3, below.

The *gastric secretion* is derived from the glands in the mucous membrane lining the stomach.

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For function see Question 3, below.

3.

SECRECTIONS.	ACTIVE PRINCIPLES.	FUNCTIONS.
Salivary.....	Ptyalin.	Changes starches into dextrin and sugar.
Gastric.....	{ Pepsin.	Changes proteids into proteoses and peptones in an acid medium.
	{ <i>Rennin</i> A curdling ferment.	Curdles the casein of milk.
Pancreatic.....	{ Trypsin.	Changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; in an alkaline medium.
	Amylopsin.	Converts starches into maltose.
	Steapsin.	Emulsifies and saponifies fats.
Intestinal.....	{ A curdling ferment.	Curdles the casein of milk.
	Invertin.	Converts maltose into glucose.

4. The blood is relieved of effete material through the lungs, the liver, the kidneys, and the skin. It is provided with new material through the alimentary canal, the lungs, the liver, the lymphatics, the spleen, and the skin (by absorption).

5. The circulation of the blood is regulated in (a) *the arteries*, by: (1) the elasticity and tone of the arteries, (2) the force and frequency of the cardiac contractions, (3) the resistance in the capillaries; (b) in the *capillaries* it is regulated by: (1) the action of the heart, (2) the action of the arteries; (c) in the *veins* it is regulated by: (1) the action of the heart, (2) aspiration of the thorax, (3) the contraction of the muscles, and (4) slightly by the valves in the veins.

The pulmonary arteries carry venous blood.

6. The functions of the cerebellum are:—Coordination and equilibrium.

7. The facial nerve is the motor nerve of the muscles of expression, also of the platysma and the buccinator; it also supplies the muscles of the external ear, the stylohyoid,

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and the posterior belly of the digastric. Through the chorda tympani it is a nerve of taste and a vasodilator of the vessels of the submaxillary and sublingual glands.

Hence section of the nerve would cause abolition of these various functions; notably, facial paralysis would ensue.

"When it is paralyzed, the muscles of the face being all powerless, the countenance acquires on the paralyzed side a characteristic, vacant look, from the absence of all expression; the angle of the mouth is lower, and the paralyzed half of the mouth looks longer than that on the other side; the eye has an unmeaning stare, owing to the paralysis of the orbicularis palpebrarum. All these peculiarities increase the longer the paralysis lasts, and their appearance is exaggerated when at any time the muscles of the opposite side of the face are made active in any expression, or in any of their ordinary functions. In an attempt to blow or whistle, one side of the mouth and cheeks acts properly, but the other side is motionless, or flaps loosely at the impulse of the expired air; so, in trying to suck, one side only of the mouth acts; in feeding, the lips and cheek are powerless, and, on account of paralysis of the buccinator muscle, food lodges between the cheek and gums." (Kirkes' *Physiology*.)

8. The pneumogastric nerve carries impulses which stimulate the respiratory center to increased activity, and hence quicken the respiration; it also contains fibers which inhibit the act of inspiration, and increase expiration.

9. The largest gland in the body is the liver. The functions of the liver are:—(1) The secretion of bile, (2) the formation of glycogen, (3) the formation of urea and uric acid, (4) the manufacture of heat, and (5) the conversion of poisonous and harmful into inert material.

10. The following occupations cause a predisposition to pulmonary diseases:—Earthenware makers, file makers, cutlers, workers in quarries, builders, bricklayers, stone-cutters, bakers, glass blowers, players on wind instruments, millers, accountants, clerks, printers, glass polishers, wool and cotton spinners.

ANATOMY.

3. The deep palmar arch extends from the base of the first interosseous space to the base of the fifth metacarpal bone, and is about one finger's breadth nearer to the wrist than the superficial palmar arch is. It is covered by the superficial and deep flexor tendons, adductor obliquus pollicis, parts of flexor brevis minimi digiti and of opponens minimi digiti. It rests upon the adductor transversus pollicis, the distal extremities of the metacarpal bones, and

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the interossei muscles. It is accompanied by the deep branch of the ulnar nerve, and two venæ comites.

7. The submaxillary triangle *contains*:—Styloglossus and stylopharyngeus muscles; stylomaxillary ligament; external carotid, internal carotid, facial, posterior auricular, temporal, and internal maxillary arteries; internal jugular, facial, and submaxillary veins; facial, pneumogastric, glossopharyngeal and mylohyoid nerves; parotid, submaxillary and lymphatic glands.

It is bounded:—*Above*, by the lower border of the inferior maxilla, and a line from the angle of the inferior maxilla to the mastoid process; *below*, by the posterior belly of the digastric and the stylohyoid; in *front*, by the median line of the neck.

10. The structures cut in performing a tracheotomy above the isthmus of the thyroid are:—The skin, subcutaneous areolar tissue, sometimes the platysma myoides, the anterior layer of the cervical fascia (separate the sternohyoid and sternothyroid muscles of each side), deep cervical fascia, the trachea, also any veins that may be encountered.

OBSTETRICS AND GYNECOLOGY.

1. (a) Toxemia or uremic intoxication.

(b) Convulsions (eclampsia).

(c) All channels of elimination must be freely opened; the bowels, skin, lungs, and liver must all be actively set to work to help the disabled kidneys. Purgatives, such as calomel, aloes, and jalap, or a saline; warm or hot baths; plenty of water to drink; also milk, and diaphoretics; meats should be prohibited; abundant fresh air is necessary; and all waist bands and corsets should be removed.

2. (a) *Dilatation of the cervix* is brought about by:—

(1) The contraction of the longitudinal muscular fibers of the upper part of the uterus which tends to separate the edges of the os; (2) the hydrostatic pressure of the bag of waters against the os during these contractions; (3) the softening of the cervix.

(b) The *forces* employed in the *stage of expulsion* are:

—(1) The contractions of the uterus (which are the main factors, and are involuntary); (2) the contractions of the diaphragm and abdominal muscles.

5. The treatment of pruritus vulvæ consists in removal of the cause, if possible; cleanliness, fresh air, tonics, and general attention to hygiene; local applications of solution of bichloride of mercury, 1:2,000; or carbolic acid, 1:100; or lead and opium; dusting powders of bismuth subnitrate, calomel, or zinc oxide are also useful.

6. Curettage is indicated:—(1) For the removal of pla-

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cental debris, (2) in hemorrhagic endometritis, and (3) for diagnostic purposes.

A dull curette should be used in (1) and a sharp curette in (2) and (3).

7. In ventral fixation, (a) the fundus of the uterus is fixed; (b) to make a firm and permanent union between the fundus of uterus and the anterior abdominal wall, to prevent prolapse; (c) it is fixed to the anterior abdominal wall; (d) silk-worm gut sutures are used.

8. *Congenital atresia of the cervix* can be treated as follows:—After all proper antiseptic and aseptic precautions, the patient, anesthetized, is placed in the lithotomy position; the cervical canal is then perforated with an aspirating needle, and afterwards with a sharp-pointed bistoury, and then stretched with dilators. The uterus is then washed out with an antiseptic solution, and the cervix packed with gauze for twenty-four hours. A plug or tube of hard rubber or glass can be worn for a few weeks to keep the newly made canal patent.

MATERIA MEDICA.

2. Example of (a) an alterative, mercury; (b) an antiperiodic, quinine; (c) an antispasmodic, amyl nitrite; (d) a diaphoretic, jaborandi; (e) a diuretic, caffeine.

3. The alkaloids of hyoscyamus are:—Hyoscyamine, dose gr. 1/128; hyoscine, dose gr. 1/128. Only the salts are used.

4. The bromides are used as nerve sedatives, to lower reflex activity, in epilepsy, to induce sleep, as anaphrodisiacs, in congestion of the brain, in delirium tremens, in diabetes mellitus, in vomiting of cerebral origin, and in the vomiting of pregnancy.

5. The preparations and doses of arsenic:—Arsenic trioxide, dose gr. 1/30; liquor potassii arsenitis, dose ℥iij; sodium arsenate, dose gr. 1/10; liquor sodii arsenatis, dose ℥iij; arsenic iodide, dose gr. 1/10; liquor arseni et hydrargyri iodidi, dose ℥jss.

6. The dose of (a) ol. terebinthinæ is ℥x; (b) tinct. veratrum viride ℥xv; (c) Basham's mixture ℥iv; (d) tincture of aconite ℥x; (e) caffeine citrate gr. ij; (f) sparteine sulphate gr. j, by mouth.

7. Atropine is often combined with morphine when the latter is used, for the following reasons:—(1) To prevent nausea and insomnia; (2) to intensify the effect of the morphine, and so a smaller dose may suffice; (3) to neutralize the effect on the pupils.

8. Three drugs most useful in the treatment of intermittent fever:—Quinine, calomel, and methylene blue.

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9. *For bronchitis:—*

℞ Acidi hydrocyanici diluti ℥xxxij.

Syrupi pruni virginianæ

Aquæ camphoræ aa ʒij. Misce.

Sig: One teaspoonful every three hours.

10. In this prescription the two salts will form an insoluble compound, silver chloride; further the sodium chloride is the chemical antidote to silver nitrate; sodii should be written sodii; aqua should be written aquæ; 1 drachm and 2 ounces should be written ʒj and ʒij, respectively; and in the last line one teaspoonful should be written in place of 1 drachm.

SURGERY.

2. "The diagnosis of strangulated hernia presents in the majority of instances no especial difficulty. The general symptoms to which most importance attaches are the severe and persisting vomiting, the absolute constipation, and the marked constitutional depression. Of the local symptoms, the most important perhaps is the absence of impulse on coughing in the tumor. In obstructed or incarcerated hernia the most conspicuous symptoms are those of obstinate constipation. In inflamed hernia the local manifestations predominate over all others. In strangulated ruptures the constitutional symptoms are the most striking." (*Treves' Manual of Surgery.*)

3. In *hydrocele* the tumor begins in the scrotum and may ascend to the inguinal region; does not vary very much in size, except to steadily increase; is translucent; is dull on percussion; gives no impulse on coughing.

In *hernia* the tumor begins in the inguinal region and may descend to the scrotum; is very variable in size, and may be reducible, or disappear on lying down; is not translucent; is not dull on percussion; gives an impulse on coughing as a rule.

4. *Syphilitic skin eruptions* are characterized:—By not itching; by being of a coppery or raw ham color; by being painless; by polymorphism, macules, papules, pustules, etc., being present at the same time; by being generally symmetrical.

5. In hemorrhage of the superficial palmar arch both ends of the bleeding vessel should be tied.

6. The chief causes of hydronephrosis are:—(1) Congenital obstruction or twisting of the ureter; (2) compression of the ureter by an abdominal tumor or gravid uterus; (3) impacted calculus in the ureter; (4) twisting or kinking of the ureter due to movable kidney; (5) stricture of the urethra; and (6) enlarged prostate gland.

7. Mastoid disease is characterized by:—Rise of tem-

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perature (up to 104° F.), tenderness, and pain over the mastoid process, which may be remittent or persistent; redness and swelling over the mastoid; bulging of the posterior and superior auditory canal; if the periosteum is affected, the auricle is unusually prominent; there may be fluctuation if pus is present.

8. The *indications for intubation* are:—Laryngeal diphtheria, or intense dyspnea from some other cause; it has been found necessary in fracture of the hyoid bone and in laryngismus stridulus.

9. In fracture of the internal condyle:—(1) If the internal condyle is held between the thumb and index finger it can be moved independently of the shaft of the ulna, and crepitus will be obtained; (2) if there is any displacement, the fragment of the internal condyle will be found *above* the level of the external condyle and the tip of the olecranon.

10. The following conditions with loss of consciousness are to be differentiated from traumatic intracranial lesions:—Apoplectic coma, alcoholic coma, uremic coma, diabetic coma, and opium poisoning.

PRACTICE OF MEDICINE.

1. Diagnostic symptoms of value in the first and second weeks of typhoid fever are:—The characteristic temperature curve, each evening showing a higher fever than the preceding; the rose colored spots on the abdomen; distended and tender abdomen, chiefly in the right iliac fossa; "pea-soup" stools; the Widal reaction; and the presence of the Eberth bacillus in the urine and feces.

2. The symptoms and physical signs of *lobar pneumonia* and *acute pneumonic phthisis* may be the same for the first eight or ten days; at this period the fever in *pneumonia* drops by crisis; whereas in *phthisis* the fever continues for some time longer and the patient gets worse; the sputum contains tubercle bacilli and elastic fibers, and instead of retaining the rusty color it becomes purulent and greenish.

4. *Leukemia* is a condition characterized by a marked increase in the number of the colorless blood corpuscles, and by enlargement and other pathological changes in the spleen, lymphatic glands, and bone-marrow.

Addison's disease is a rare condition characterized by some pathological condition of the suprarenal glands and the sympathetic nervous system, and in which the skin becomes bronzed.

Myxedema is a condition characterized by atrophy of the thyroid gland, mental dullness, sluggish movement, and thick speech.

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Brachycardia is a condition characterized by abnormal slowness of the pulse.

6. The symptoms of acute intestinal obstruction are:—(1) Sudden, intense, localized pain, at first in paroxysms, later continuous; (2) early and persistent vomiting, which later becomes stercoraceous; (3) absolute constipation; (4) abdomen tender, distended, and tympanitic; (5) anxious countenance, cold and clammy skin, feeble and rapid pulse, and collapse.

7. In *uremia*:—The coma is deep; the pulse slow; the respirations frequent and irregular; the urine shows the presence of albumin and casts, with a diminished output of urea; there may be a urinous odor to the breath.

In *alcoholic coma*:—The patient can generally be aroused; the coma is not, as a rule, complete; the face may be flushed; the pupils are normal or dilated; the respirations are normal in frequency, but deep; the skin is cool and moist, and the body temperature may be below normal.

In *cerebral hemorrhage*:—There are generally paralysis of the head and upper limbs; and in left-sided lesions there may be aphasia; the pulse is slow and full; the respirations are at first slow, regular, and stertorous, later on becoming of the Cheyne-Stokes type.

8. By thrombosis of the brain is meant the formation of a clot or plug in a cerebral artery.

The cause is generally atheroma, or endarteritis, due to syphilis.

9. *For chronic constipation:*

R Aloini gr. ij.
Extracti belladonnæ gr. jss.
Strychninæ sulphatis gr. 1/6. M.
Fiat massa in pilulas no. xij dividenda.
Sig: Take one at bedtime.

STATE BOARD EXAMINATION QUESTIONS.

STATE MEDICAL EXAMINING BOARD OF NORTH DAKOTA.

ANATOMY.

(Answer all questions.)

1. Locate and describe fully the sternum.
2. Locate and describe fully the Trapezius muscle and give its relations.
3. Locate and describe the internal carotid artery of the right side, and mention its branches.
4. Locate and describe the thoracic duct.
5. Locate and describe the pancreas.
6. Locate and describe the heart.

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7. Locate and describe the pneumogastric nerve, giving its origin and distribution.

PHYSIOLOGY.

1. Describe digestion fully from the time food enters the mouth until the residue is evacuated.
2. What are the principal functions of the hepatic cells?
3. Describe the coagulation of the blood and state what conditions favor it and what retard it.
4. Give the vital capacity of the lungs.
5. Explain the sounds of the heart and the cause of them.
6. What is the function of the sympathetic nervous system?
7. What special centers are located in the medulla oblongata?
8. What is the function of the anterior spinal nerve roots.

MATERIA MEDICA.

1. What is a disinfectant and how does it differ from a deodorant, where use the latter and where employ the former?
2. What is a Seidlitz powder?
3. What are the salines?
4. What is the use of sanguinaria?
5. What is ergot, how obtained, its physiological effects?
6. What is buchu and in what diseases is it employed?
7. Name some of the vegetable astringents.
8. What are narcotics and give the most important chemical constituents of opium.
9. What is lime water—effects and uses?
10. Electricity for medicinal purposes is obtained from what sources?

CHEMISTRY AND TOXICOLOGY.

1. Name the halogens and describe one of the group.
2. Define the following terms and give an example of each: (a) Water of crystallization. (b) Binary compound. (c) Double salt. (d) Double decomposition.
3. Express by equations the chemical reactions when the following substances are combined: (a) Barium dioxide and sulphuric acid. (b) Slaked lime and sal ammoniac. (c) Lead acetate and sulphuretted hydrogen.
4. Give the chemical test for free HCl in gastric contents, and write equation to show reaction.
5. Describe the diazo reaction and give its diagnostic value.

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6. Name five vegetable poisons and an antidote for one of them.
7. What is carbolic acid, chemically speaking? Name an antidote for it.
8. How would you detect arsenical poisoning? Give treatment for a case.
9. Give treatment for poisoning by swallowing mercuric chloride.
10. Describe a case of opium poisoning.

HISTOLOGY.

1. Describe the structure of bone.
2. Describe the structure of a medium sized artery.
3. Give the histology of cardiac muscle.
4. Give the classification of glands (as to structure) found in the skin and mucous membrane. Mention examples of each.
5. Describe the microscopical appearance of the section of a nerve trunk.

PATHOLOGY.

1. Define (a) Necrosis, (b) Hyperemia, (c) Edema.
2. Define a tumor. How does it differ from hypertrophic tissue?
3. What pathological changes occur in the liver and pancreas in diabetes?
4. What is inflammation?
5. Define sarcoma and name varieties.

PRACTICE OF MEDICINE.

1. Define pertussis and give incubation period and treatment.
2. Give etiology, symptoms, and treatment of diabetes mellitus.
3. Give etiology, symptoms, and treatment of multiple neuritis.
4. Give cause and symptoms of biliary colic and differentiate from appendicitis.
5. Give treatment with prescriptions for a case of acute articular rheumatism.

OBSTETRICS.

1. Give, in order of their appearance, the signs and symptoms of pregnancy, subjective and objective.
2. Give causes, symptoms, and treatment of phlegmasia alba dolens.
1. Treatment of: (a) Threatened abortion.
(b) Inevitable abortion.
4. Symptoms and treatment of placenta prævia.
5. Describe your first case of labor.

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DISEASES OF WOMEN AND CHILDREN.

1. How would you repair the perineum?
2. What symptoms may follow displacement of the uterus?
3. How would you diagnose inflammation of the tubes, and what is the most common cause?
4. How would you treat an acute gonorrhea in the female?
5. Give causes of suppressed menstruation and your treatment.
6. Give directions for feeding an infant three months old with artificial food.
7. Give causes and treatment of simple croup.
8. Name causes for infantile convulsions.
9. Give treatment for intestinal worms.
10. Diagnosis between tonsillitis and diphtheria.

SURGERY.

(Answer any six questions.)

1. In what sex does femoral hernia most frequently occur? Describe operation for cure.
2. Describe operation for gallstones.
3. (a) Give briefly the preparation of a patient and surgeon for an abdominal operation. (b) Locate the attached or cecal end of the appendix on the abdominal wall.
4. Indicate a treatment for hemorrhoids. (a) Palliative. (b) One operative method.
5. (a) What is meant by aseptic? (b) Antiseptic. (c) What is the best method of rendering surgical instruments aseptic? (d) In what strength should bichloride of mercury be used as a lotion? (e) Carbolic acid. (f) What is necessary to render ordinary water sterile?
6. Give diagnosis and treatment of floating kidney.
7. Give symptoms and treatment of fracture of the base of the skull.
8. Name the different forms of sutures, and describe the Glover's suture.
9. Give the signs, symptoms, and approved treatment of fracture of the patella.
10. How would you prepare a patient for anesthesia?

PREVENTIVE MEDICINE.

1. What are the chief causes and what the means of preventing dysentery and diarrhea?
2. Give the cause of scurvy and the method of prevention and cure.
3. What causes military ophthalmia and when it prevails how treat it? Can it be cured?

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4. Give the measures to be taken for the prevention of venereal diseases.
5. Is phthisis pulmonalis hereditary or acquired, and what three points in its treatment are essential and most effective?

NERVOUS DISEASES.

1. Give the causes, symptoms, diagnosis, and treatment of epilepsy.
2. Define the terms: Insanity, delusion, illusion, hallucination.
3. Give causes, symptoms, diagnosis, and treatment of acute transverse myelitis.
4. What is chorea? Give causes, diagnosis, and treatment.
5. Differentiate between cerebral hemorrhage, uremic coma and alcoholic coma.

EYE AND EAR.

1. What is ophthalmia neonatorum? Give treatment.
2. What are the diagnostic differences between conjunctivitis and iritis? Give treatment of each.
3. What are the causes, symptoms and treatment of chalazion?
4. Describe fully the effect of nasopharyngeal adenoids on the ear and its function.
5. What are the symptoms, etiology, and treatment of mastoiditis?

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

STATE MEDICAL EXAMINING BOARD OF NORTH DAKOTA.

PHYSIOLOGY.

2. The principal functions of the hepatic cells are: (1) The secretion of bile, (2) the formation of glycogen, (3) the formation of urea and uric acid, (4) the manufacture of heat, and (5) the conversion of poisonous and harmful into inert material.
3. When blood is withdrawn from the blood-vessels of the living body, it first becomes viscid, then sets, and is converted into a jelly-like mass. This is due to the formation of fibrin. The jelly contracts forming the clot; and at the same time the serum is squeezed out from the clot. Various circumstances and conditions will hasten or delay the process of coagulation. In man, the blood generally becomes viscid in from two to three minutes; it forms

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the jelly-like mass in from five to six minutes; a few minutes later the serum begins to appear; and the whole process is completed in from twenty-four to thirty-six hours. The clot then floats in the serum. The process is thus summed up by Halliburton: In the plasma a proteid substance exists, called Fibrinogen. From the colorless corpuscles a nucleo-proteid is shed out, called Prothrombin. By the action of calcium salts prothrombin is converted into fibrin ferment, or Thrombin. Thrombin acts on fibrinogen in such a way that two new substances are formed: one of these is unimportant and remains in solution; the other is important, viz., Fibrin, which entangles the corpuscles, and so forms the clot.

Conditions *favoring* coagulation of the blood are: (1) Moderate warmth, (2) contact with foreign matter, (3) agitation, (4) the presence of calcium salts.

Conditions *retarding* coagulation of the blood are: (1) A low temperature, (2) the addition of neutral salts in large quantities, (3) contact with oil, (4) contact with the living vessel walls, (5) when mixed with an oxalate, (6) the injection of peptones or lead extract.

4. The vital capacity of the lungs is about 225 to 250 cubic inches.

5. The *causes* producing the *first* sound of the heart are not definitely ascertained; the following are supposed to be causatory factors: (1) The vibration and closure of the auriculo-ventricular valves, (2) the muscular sound produced by the contraction of the ventricles, and (3) the cardiac impulse against the chest wall.

The *second* sound is caused by the vibration due to the closure of the semilunar valves.

6. The *functions* of the sympathetic nervous system: "It may safely be said that the sympathetic system has, to a great extent, a controlling influence over the secretion of most of the glands, the lacrymal, the salivary, the sweat glands, the glands of the stomach and intestines, the liver, the kidney, etc.; that it presides over the circulation by regulating the caliber of the blood-vessels and the action of the heart; that it influences respiration; and, finally, that all involuntary muscles, those of the digestive apparatus, of the genitourinary system, of the hair follicles (pilomotor-nerves), are under its control to such extent that, for instance, in certain mammals the bladder still continues to fulfill its function for weeks after all the cerebrospinal motor nerves leading to it have been severed. In short, we find that all vegetative life of the organism is, to a greater or less extent, under the control of the sympathetic system. Therefore it may properly be called the vegetative

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nerve system *par excellence*."—(*Reference Handbook of the Medical Sciences*.)

7. The special centers located in the medulla oblongata are: (1) Center for mastication, (2) for secretion of saliva, (3) for sucking, (4) for deglutition, (5) for vomiting, (6) for voice, (7) center for expression, (8) cardiac centers, (9) respiratory centers, (10) vasomotor centers.

8. The function of the anterior spinal nerve roots is: Motion, to the muscles which they supply.

MATERIA MEDICA.

1. A *disinfectant* is an agent or substance which restrains infectious diseases by destroying or removing their specific poisons.

A *deodorant* is a substance which destroys the odorous products of putrefaction.

A *deodorant* is indicated when there is simply a foul odor to be disposed of.

A *disinfectant* is indicated where disease germs are present.

2. A Seidlitz powder consists of: (1) Potassium and sodium tartrate, gr. cxx, and sodium bicarbonate, gr. xl; these are mixed and put in one paper. (2) Tartaric acid, gr. xxxv, in another paper. The dose is one or two of each of these dissolved separately in water and the solutions poured together.

3. Salines are purgatives composed of the neutral salts of metals of the alkalies, or of the alkaline earths. The salines are: Magnesium sulphate, magnesium citrate, sodium sulphate, sodium phosphate, sodium chloride, sodium and potassium tartrate, potassium tartrate, potassium bitartrate, and potassium sulphate.

4. *Sanguinaria* is used to cause sneezing, to produce salivation, purging, vomiting; in small doses it is an expectorant.

5. Ergot is the sclerotium of the *Claviceps purpurea*. It should be moderately dried, preserved in a close vessel, and a few drops of chloroform should be dropped upon it occasionally. It is not fit for use if more than a year old.

Ergot stimulates and causes contraction of involuntary muscle fibers, hence it is a vasoconstrictor, hemostatic, and oxytocic. It is also a cardiac sedative, it raises the blood pressure, it increases peristalsis, and is an emmenagogue.

6. Buchu is the leaves of the *Barosma betulina*. It is employed in chronic inflammatory conditions of the genitourinary tract as cystitis, urethritis, pyelitis; also in chronic bronchitis, uric acid diathesis, prostatic inflammation, and dyspepsia.

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7. Vegetable astringents: Gallotannic acid, nut galls, hamamelis, catechu, kino, krameria, hematoxylon, granatum, quercus alba.

8. Narcotics are agents which induce stupor or sleep, and at the same time are capable of relieving pain.

The most important chemical constituents of opium are: Morphine, narcotine, codeine, thebaine, papaverine, and meconic acid.

9. Lime water is a solution of unslaked lime in water. It is an antacid, a mild astringent, and assists in the formation of bone.

It is used in nausea and vomiting due to gastric acidity; to aid in the digestion of milk; in diabetes; in uric acid diathesis. It has been applied to the membrane in diphtheria; and externally, in tinea capitis, and (mixed with olive or linseed oil) in burns.

10. Electricity for medicinal purposes is obtained from the following sources: Current from electric light mains, dynamo and driving plant, accumulators, primary batteries.

CHEMISTRY AND TOXICOLOGY.

1. The halogens are: Fluorine, chlorine, bromine, and iodine.

Chlorine exists only in combination, chiefly in sodium chloride. It is a greenish yellow gas, very irritant, and with a penetrating odor. It tends to combine with other elements, and such combination may be attended with the giving off of heat and light, or an explosion. With hydrogen it combines in the light to form hydrochloric acid. In the presence of water it is an active bleaching and disinfecting agent. Its atomic weight is 35.5, and its valence one.

2. (a) *Water of crystallization* is the water necessary, in many crystals, to the maintenance of the form, and sometimes the color, of the crystal. Example: $\text{FeSO}_4 \cdot 7\text{Aq.}$ denotes ferrous sulphate with seven molecules of water of crystallization.

(b) A *binary compound* is a compound composed of two elements only. Example: NaCl , sodium chloride.

(c) A *double salt* is a salt formed by the substitution of different elements or radicals for two or more atoms of the replaceable hydrogen of an acid. Example: $\text{NaKC}_4\text{H}_4\text{O}_6$, sodium potassium tartrate.

(d) *Double decomposition* is a reaction in which both of the reacting compounds are decomposed to form two new compounds. Example: $\text{CuSO}_4 + \text{H}_2\text{S} = \text{H}_2\text{SO}_4 + \text{CuS}$.

3. (a) $\text{BaO}_2 + \text{H}_2\text{SO}_4 = \text{BaSO}_4 + \text{H}_2\text{O}_2$.

(b) $\text{CaH}_2\text{O}_2 + 2\text{NH}_4\text{Cl} = \text{CaCl}_2 + 2\text{NH}_3 + 2\text{H}_2\text{O}$.

(c) $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 + \text{H}_2\text{S} = \text{PbS} + 2\text{C}_2\text{H}_3\text{O}_2$.

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4. There are three or four chemical tests for free HCl in gastric contents; the best is probably the Dimethyl-amido-azobenzol test. The reagent is used in 0.5 per cent. alcoholic solution, of which one or two drops are added to a like amount of the filtered gastric juice. If free HCl is present, the yellow solution turns red.

5. For the diazo reaction two solutions are required: (1) A saturated solution of sulphanilic acid in a mixture of 50 c.c. of hydrochloric acid and 950 c.c. of water; and (2) a 0.5 per cent. solution of sodium nitrite.

To make the test, 1 c.c. of (2) is added to 40 c.c. of (1), and the mixture thoroughly shaken. Equal quantities of this mixture and the urine to be tested are shaken together in a test tube, and 1 c.c. of ammonia is then floated upon the surface, when, in an affirmative result, a red band is formed at the junction of the fluids.

Its diagnostic value is uncertain. Von Jaksch "disclaims for this test any clinical importance whatever." Others have claimed that the reaction is pathognomonic of typhoid; but it has been found in other diseases besides typhoid—namely, phthisis, pneumonia, measles, scarlet fever, small-pox, and malaria.

6. Five vegetable poisons: Aconite, belladonna, strychnine, opium, and digitalis; tannic acid is said to be the chemical antidote for digitalis.

7. Chemically speaking, carbolic acid is phenol, or phenyl hydroxid, C_6H_5OH .

The antidote for it is sodium sulphate, or alcohol.

8. *Test for arsenic:* Reinsch's test is as follows: To the suspected fluid add a little pure HCl; suspend in the fluid a small strip of bright copper foil, and boil. If a deposit forms on the copper, remove the copper, wash it with pure water, dry on filter paper, but be careful not to rub off the deposit. Coil up the copper, and put it into a clean dry glass tube, open at both ends, and apply heat at the part where the copper is. If arsenic is present there will appear in the cold part of the tube a mirror, which will be found on microscopical examination to consist of octahedral crystals of arsenic trioxide.

Treatment consists in giving zinc sulphate to induce vomiting, syphoning out the stomach, and administering freshly prepared solution of ferric hydroxide.

9. The antidote is white of egg, but too much must not be given at one time; this should be followed by an emetic.

10. In opium poisoning there may be three stages: (1) A period of excitement, in which the patient is active, talkative, and has hallucinations; (2) a period of drowsiness, in which the patient is sleepy, but may be aroused; his

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face is pale, lips livid, pupils contracted; this passes into (3) the stage of coma, from which the patient cannot be aroused, the reflexes are abolished, the pupils are very contracted, the pulse is slow and irregular, and the respirations are infrequent and shallow.

HISTOLOGY.

4. I. SIMPLE GLANDS.—Duct undivided.
 - (a) *Simple tubular*.—Undilated at end—e.g. Lieberkühn's follicles, sweat, and many gastric glands.
 - (b) *Simple acinous (alveolar or saccular)*.—Dilated at end—e.g. some sebaceous glands (rare).
- II. COMPOUND GLANDS.—Duct divided.
 - (a) *Compound tubular*.—Branched elongated tubes, no acini—e.g. most gastric glands.
 - (b) *Compound acinous or alveolar (racemose glands)*, branched duct with saccular acini on terminal branches—e.g. salivary, sebaceous, and Meibomian glands; the mucous glands of the mouth, tongue, palate, pharynx, nose, esophagus, and respiratory tube.
 - (c) *Acino-tubular*.—Branched duct, with elongated narrow acini on terminal branches—e.g. Brunner's glands.

(From Cunningham's *Anatomy*.)

PATHOLOGY.

1. (a) *Necrosis* is the complete and permanent arrest of nutrition in a part; or local death of tissues.
 - (b) *Hyperemia* is excess of blood in a part of the body.
 - (c) *Edema* is excess of liquid in the connective tissues of the body.
2. A *tumor* is an atypical new formation, not the result of inflammation, and which has no physiological function. A tumor differs from hypertrophic tissue in that the latter retains its original structure, shape, and function.
3. In diabetes: The *liver* is enlarged, and may undergo fatty degeneration or become sclerotic. The *pancreas* may not be affected at all, or there may be an interstitial pancreatitis, or there may be degenerative changes in the islands of Langerhans, or the pancreas may be atrophied. It is probable that the diabetes is due to disease of the pancreas, and not *vice versa*.
4. *Inflammation* has been defined: (1) As the succession of changes which take place in a living tissue as the

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result of some kind of injury, provided that this injury be insufficient immediately to destroy its vitality.

(2) As the reaction of tissues to an injury.

5. A *sarcoma* is a malignant tumor of the connective tissue type, in which there is abundant cell formation with very scanty intercellular substance.

Sarcomata are classified:

I. According to the *form of the cell* which predominates, as Round-cell, Spindle-cell, and Mixed-cell sarcomata.

II. According to the *stroma*, as Myxo-sarcoma, Chondrosarcoma, Fibro-sarcoma, and Osteo-sarcoma.

III. According to the *secondary changes* which they may undergo, as Lipo-sarcoma, Chloroma, Melano-sarcoma, and Calcifying sarcoma.

OBSTETRICS.

1. The *subjective* signs of pregnancy, in the order of their appearance, are: Cessation of menstruation, morning sickness, increased frequency of urination, active fetal movements.

The *objective* signs of pregnancy, in the order of their appearance, are: Softening of the cervix, changes in the mammary glands, discoloration of the vulva and vagina, pulsation in the vaginal vault, Hegar's sign, active fetal movements, ballottement, palpation of the fetus, intermittent uterine contractions, hearing the fetal heart-beat, rate of growth of the uterine tumor.

DISEASES OF WOMEN AND CHILDREN.

2. The following symptoms may follow displacements of the uterus: Backache, bearing-down pains, a feeling of pressure in the pelvis, constipation, hemorrhoids, frequent or painful urination, leucorrhea, menstrual disturbances, as dysmenorrhea or menorrhagia, sterility; there may also be *general symptoms*, as headache, indigestion, nausea, anorexia, neurasthenia, and general malaise.

3. Inflammation of the tubes is diagnosed by: A dragging sensation in the neighborhood of the affected tube; colicky pain, which is increased on exertion or even on standing; abdominal tenderness; menstrual disorders, as amenorrhea, metrorrhagia, dysmenorrhea, menorrhagia; dyspareunia; there may be septic symptoms and peritonitis; sterility generally ensues. On examination there will be found a fullness in Douglas' pouch and one or both lateral fornices; in these latter will be felt either the tubes, distorted and possibly adherent, or a sausage-shaped tumor, which is very painful; the uterus is retroverted or

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retroflexed, and may be bound down by adhesions; there may be an intermittent expulsion of pus accompanied and preceded by a burning pelvic pain.

The most common cause is infection, either gonorrheal or puerperal.

4. Acute gonorrhea in the female requires: Rest, if possible in bed; freedom from alcoholic or sexual excitement; a mild and unirritating diet; salines and diuretics; plenty of water to drink; a warm sitz bath; douching of vagina with about a gallon of a 1:5,000 bichloride solution, or of borax (1 dram to the quart); the douche is to be taken in the recumbent position.

5. The causes of suppressed menstruation are: Pregnancy; lactation; severe physical or mental shock; obesity; taking cold near the time of a menstrual period; certain diseases, such as typhoid, tuberculosis, pneumonia, diabetes, nephritis, anemia, chlorosis, syphilis, sepsis; change of climate; absence, lack of development, malformation, atresia, disease, or removal of some part of the genital tract; hysteria, and various mental disorders.

6. For a child three months old:

R. Cream ℥ss (one tablespoonful)
Milk ℥jss (three tablespoonfuls)
Water ℥jss (three tablespoonfuls)
Milk sugar ℥j (one teaspoonful)
Salt gr. v. (a pinch).

Feed every two and a half hours.

8. Causes of infantile convulsions are: "Overeating, especially of indigestible food; rachitis, debility from exhausting diarrheal diseases; high fever, especially at the onset of the acute specific infections; very seldom dentition, phimosis, and acute middle-ear inflammation; injuries to the brain at birth, infantile hemiplegia, meningitis, and tumor of the brain; rarely of spinal cord disease."—(From Butler's *Diagnostics of Internal Medicine*.)

9. *Treatment of tapeworm*: Give a dose of castor oil at night, and the following morning give half a dram of freshly prepared extract of male fern, and a few hours later give another dose of castor oil.

Treatment of roundworm: A dose of santolin and calomel should be given at bedtime for a few nights, and a dose of castor oil the morning after the last powder.

Treatment of seatworm or pinworm: A large enema of a cold infusion of quassia. Care must be taken to prevent reinfection.

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10.

TONSILLITIS.	DIPHTHERIA.
<ol style="list-style-type: none"> 1. Sudden onset. 2. Chill. 3. Temperature 103° to 105° F. 4. Vomiting is occasional. 5. Albuminous urine rare. 6. Tonsils considerably enlarged. 7. Exudation in spots or a pseudomembrane. 8. Pseudomembrane margins are the same color as the rest of the mucous membrane of the tonsil. 9. Pseudomembrane not adherent; easily wiped away with cotton. 10. Leaves no bleeding surface. 11. Pseudomembrane does not re-form. 12. Pseudomembrane limited to the tonsil. 13. Intense active hyperemia of the soft palate. 14. Bacteriological examination shows staphylococci, streptococci, and pseudodiphtheria bacilli. 	<ol style="list-style-type: none"> 1. More gradual onset. 2. Chill is rare. 3. Temperature 101° to 103° F. 4. Vomiting is common. 5. Albuminous urine common. 6. Tonsils not much enlarged unless chronic hypertrophy of the tonsils previously existed. 7. Exudation, a thick membrane. 8. Diphtheritic membrane margins are dark red or purplish in color for a distance of a quarter of an inch. 9. Membrane very adherent; removed with difficulty, and only with forceps. 10. Denuded surface bleeds. 11. Membrane re-forms in a few hours. 12. Membrane also found on the pillars of the fauces, the soft palate, and posterior pharyngeal wall. 13. Soft palate almost normal in appearance. 14. Bacteriological examination shows Klebs-Loeffer bacilli.

(From Coakley's *Diseases of the Nose and Throat.*)

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SURGERY.

3. (b) Draw a straight line on the abdominal wall from the anterior superior spine of the ilium to the umbilicus; on this line, and about one and a half or two inches internal to the anterior superior spine, the cecal end of the appendix should be found.

4. (a) The *palliative* treatment of hemorrhoids consists in: The use of unirritating laxatives, to prevent constipation; cleansing the parts; rest; application of heat or cold or applications of opium or gall.

(b) The *operative* treatment consists in: Crushing with a clamp and then removing with a cautery; or complete resection of the mucous membrane; or they may be cut off after ligation or crushing.

5. (a) *Aseptic* means sterile, entire absence of germs or their products.

(b) An *antiseptic* is an agent that destroys microorganisms. The object of antiseptics is to produce asepsis.

(c) The best method of rendering surgical instruments aseptic is by boiling them for about fifteen minutes in water, each quart of which contains a tablespoonful of sodium carbonate.

(d) As a lotion, bichloride of mercury can be used in strengths varying from 1:10,000 to 1:500.

(e) Carbolic acid in strength varying from 1:60 to 1:40.

(f) To render ordinary water sterile, first filter it, then boil for half an hour, and place it in sterilized glass containers, the mouths of which are to be covered with several thicknesses of sterile gauze.

8. The different forms of sutures are: The interrupted, continuous, buried, chain-stitch, mattress or quilt, subcuticular, twisted or hare-lip, quilled, shotted, button or plate, Lembert's, Czerny, Halsted's, purse-string, relaxation and coaptation.

Glover's suture is the same as the continuous suture; it is made by passing the threaded needle through the skin about an eighth to a quarter of an inch from the edge of the wound. The needle is then passed from within outwards through the tissues of the opposite flap, at the same distance from the edge of the wound. This is done repeatedly, as often as the size of the wound requires; the thread is not cut till after the last stitch is passed, and knotted.

PREVENTIVE MEDICINE.

3. *Military ophthalmia* is purulent conjunctivitis, due to contagion from gonorrheal virus. It is caused by the gonococci.

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"Treatment.—Prophylactic: Great precautions must be observed to prevent infection of the eyes of the physician, nurse, and attendants through spurring of the discharge during examination or treatment; protecting glasses should be worn whenever exposed to this risk. Contaminated fingers must be carefully disinfected. Materials which have been used for cleansing the eye must be burned.

"The non-affected eye should be protected from infection by the application of Buller's shield. This consists of a watch glass, securely held in place by adhesive plaster applied to the side of the nose, the cheek, and forehead. The junction of skin and plaster is sealed by a layer of collodion. The center of the glass is left uncovered by plaster to permit inspection of the eye, and a small part of the outer margin of the watch glass is usually left free in order to allow air to enter and contribute to the comfort of the shielded eye.

"Treatment of the first stage: Iced compresses are used continuously, day and night. The eye must be carefully cleansed and the secretion removed as rapidly as it forms. When very abundant, this will be necessary every quarter or half an hour. For this purpose a saturated solution of boric acid is most frequently employed, being allowed to trickle in between the lids from a piece of absorbent cotton dripping with the solution; then the secretion which has been washed out is gently wiped off the margins of the lids.

"The iced compresses may be used continuously at first. But when the tense, reddened, and swollen condition of the lids becomes less marked the application of cold must be reduced to every other hour, or every third hour; too much refrigeration interferes with the nutrition of the cornea. When the cornea is involved, we must carefully gauge the amount of cold so as not to use an excess. In the later stages, when there is little swelling, and corneal infiltration or ulceration exists, hot applications may be indicated. . .

"In the initial stage, if the disease be very severe, from three to six leeches, applied to the corresponding temple, may be of service. Occasionally there is so much tension that the eye cannot be cleansed on account of the difficulty in separating the lids, and in addition harmful pressure is exerted upon the eyeball; in such cases it may become necessary to widen the palpebral fissure by a division of the external canthus.

"Treatment of the Later Stages: When the lids have lost their swollen and angry appearance and the discharge begins to diminish, a one or two per cent. solution of nitrate of silver is brushed upon the everted conjunctiva once a

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day. This may be done even though the cornea is implicated. It is continued until the patient is well, or until the papillary swelling has persisted for some time. Then, if silver no longer exerts a favorable influence, we may apply glycerole of tannin (five to ten per cent.), the alum stick, or sulphate of copper pencil once a day."

"Prognosis depends upon the severity of the case, and upon the behavior of the cornea. It is always grave." (May, *Diseases of the Eye*.)

NERVOUS DISEASES.

2. According to Taylor, the term *insanity* is applied to "those states of disordered mind in which a person loses the power of regulating his actions and conduct according to the ordinary rules of society. In all cases of real insanity the intellect is more or less affected."

A *delusion* is a belief in something which has no real existence, but is purely imaginary; and out of which the person cannot be reasoned. An *illusion* is a false or perverted impression, received through one of the senses. An *hallucination* is the same as an illusion, but without any material basis.

If an individual believes himself to be made of glass, and is afraid of being touched lest he be broken, he is suffering from a *delusion*. If the whistling of the wind is mistaken for a voice telling a person to do a certain thing—that would be an *illusion*. If a person fancied he heard a voice when there was nothing at all to be heard, that would be an *hallucination*.

5. In *cerebral hemorrhage*:—There is generally paralysis of the head and upper limbs; and in left-sided lesions there may be aphasia; the pulse is slow and full; the respirations are at first slow, regular, and stertorous, later on becoming of the Cheyne-Stokes type.

In *uremic coma*:—The coma is deep; the pulse slow; the respirations frequent and irregular; the urine shows the presence of albumin and casts, with a diminished output of urea; there may be a urinous odor to the breath.

In *alcoholic coma*:—The patient can generally be aroused; the coma is not, as a rule, complete; the face may be flushed; the pupils are normal or dilated; the respirations are normal in frequency, but deep; the skin is cool and moist, and the body temperature may be below normal.

EYE AND EAR.

1. *Ophthalmia neonatorum* is an infectious, purulent inflammation of the conjunctiva in the new-born.

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It is due to the gonococcus or some other pyogenic germ; and is produced by contact of the eye with the vaginal secretion of the mother during labor, or infected fingers, or instruments, etc.

The treatment is:—(1) Prophylactic—whenever there is the possibility of infection, or in every case, wash the eyelids of the new-born child with clean warm water, and drop on the cornea of each eye one drop of a one or two per cent. solution of nitrate of silver, immediately after birth. (2) *Remedial:*—Wash the eyes carefully every half hour with a saturated solution of boric acid; pus must not be allowed to accumulate. Two drops of a two per cent. solution of nitrate of silver must also be dropped on to the cornea every night and morning. The eyes must be covered with a light, cold, wet compress. The patient must be isolated, and all cloths and compresses used must be burnt.

2.

CONJUNCTIVITIS.	IRITIS.
1. No change in iris.	1. Discolored and altered iris.
2. Pupil normal.	2. Pupil small, gray, sluggish, irregular after use of atropine.
3. Anterior chamber normal.	3. Exudation in anterior chamber.
4. Conjunctival injection, coarse meshes, most pronounced in fornix and fading toward the cornea.	4. Ciliary (circumcorneal) injection; pink zone of fine vessels surrounding cornea and fading toward fornix.
5. Mucous or muco-purulent secretion.	5. Lacrymation, but no secretion.
6. Discomfort, but no real pain.	6. Pain, worse at night.
7. Conjunctiva reddened and opaque.	7. Conjunctiva usually transparent.
8. No interference with vision.	8. Vision diminished in acuteness.

(May's Diseases of the Eye.)

4. "The presence of adenoid tissue in the vault of the pharynx affects the ear in two ways. If the mass is large by direct pressure upon the Eustachian orifice the supply of air in the tympanic cavity may be disturbed. . . . Any slight increase in the volume of the mass will close the lumen of the tube, after which the intratympanic air

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is gradually absorbed by the blood which circulates through vessels in the walls of the cavity. With each act of swallowing, at which time the tube opens momentarily, the air is aspirated into the nasopharynx, the tube closing so quickly that the passage of air into the tympanum does not take place. In this manner a passive congestion of the mucous membrane of the middle ear is produced, a condition which constitutes practically the first stage of an inflammation, and, if long continued, results in permanent tissue changes. . . . The more important manner in which adenoid growths affect the organ of hearing is by the obstruction to the venous return current from the tympanum and labyrinth. The pharyngeal tonsil, in virtue of its presence, may exert sufficient pressure to partially obstruct the venous flow from the tympanic cavity. Any condition which affects, for a considerable period, the circulation within the middle ear will also cause a disturbance of the labyrinthine circulation from an alteration in the tension of the fluid contained. Such changes in the labyrinth render it particularly susceptible to inflammation, either as the result of infection or of mechanical irritation, the most fruitful source of the latter being the crowding inward of the ossicular chain by atmospheric pressure, when the tension of air within the tympanum is reduced. . . . There may also be a diminution of bone conduction and a hyperæsthetic condition of the auditory nerve." (From Dench's *Diseases of the Ear*.)

STATE BOARD EXAMINATION QUESTIONS.

OHIO STATE BOARD OF MEDICAL REGISTRATION AND EXAMINATION.

ANATOMY.

1. What is the difference between mucous and serous membranes?
2. What forms the deep palmar arch?
3. Describe the origin, course, and distribution of the renal arteries.
4. Describe the different varieties of epithelium.
5. Name the muscles that form the abdominal walls.
6. Name the cavities, openings, and valves of the heart.
7. What features of the bony skeleton characterize the sex?

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8. What is a ginglymus joint? Give an example.
9. Give the gross anatomy of the liver.
10. Describe the cerebellum.

PHYSIOLOGY.

1. What part of the nervous system is involved in stammering speech?
2. Describe the pneumogastric nerve and its function.
3. Where are the red blood corpuscles formed and what is their function?
4. Describe lymph. How is it formed?
5. Into what classes is food divided? Give a general description of each.
6. What is the pulse and what do its varieties signify within physiological limits?
7. What are proteids and how are they formed?
8. What physiological conditions influence the secretion of urine?
9. Describe the physiology of menstruation.
10. Where and in what form do the hydrocarbons reach the circulation?

CHEMISTRY.

1. What is the action of a solution of potassium permanganate when used as a disinfectant?
2. Give a simple test for organic impurities in water.
3. Give the reaction of cow's milk and mother's milk.
4. Name the inorganic constituents of the gastric juice.
5. What is the difference between urea and uric acid?
6. Give the formula, properties, and uses of hydrogen dioxide.
7. What chemical tests are most important in the analysis of urine?
8. Give the chemical names for cream of tartar, Glauber's salt, Epsom salt, copperas, sugar of lead, and common salt.
9. What antidotes should be used in corrosive sublimate poisoning?
10. Name four organic acids and give the source of each.

MATERIA MEDICA AND THERAPEUTICS.

1. From what is senna obtained? Give some indications for its use and the preparations employed.
2. Name three drugs that may be used to increase the flow of urine.
3. Write a prescription for internal use in a case of chronic eczema of the gouty type.
4. What antidote would you use in a recent case of poisoning by opium taken by the mouth?
5. When should alkalies be given with reference to meals? Why?

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6. What are some of the therapeutic uses of ammonium carbonate? How should it be exhibited?
7. Upon what does the therapeutic value of calcium depend?
8. What remedy do you suggest to be used in diabetic coma?
9. Name three styptics.
10. What are some therapeutic aims of the hot pack?

PHYSICAL DIAGNOSIS.

1. State diagnostic value of decreased resonance of the percussion sound over the lung.
2. State diagnostic significance of dullness or flatness in the left anterior axillary line from the sixth to the eighth rib (Traube's area).
3. What pathological meaning has an amphoric resonance on the chest elicited by percussion?
4. What pathological significance is attached to the cracked-pot sound?
5. In what affections of the lungs is bronchial breathing found?
6. Explain significance of friction sounds.
7. What pathological significance is derived from the enlargement of the superficial abdominal veins (caput medusæ)?
8. What diagnostic significance is given by a frequent pulse (tachycardia)?
9. State pathological significance of the facial paralysis.
10. Describe location and quality of murmurs indicating mitral insufficiency.

PRACTICE AND PATHOLOGY.

1. What points in the microscopical appearance of sarcoma would enable you to make a diagnosis?
2. Describe the technique of rectal alimentation. What foods are used?
3. What symptoms mark failure of compensation in chronic valvular diseases of the heart?
4. What amount of urine is excreted in twenty-four hours in health? What is its specific gravity? How are each of these influenced in:—Acute nephritis? Chronic parenchymatous nephritis? Chronic interstitial nephritis? Diabetes mellitus?
5. Describe a typical case of typhoid fever from time of infection.
6. Name the exanthemata acuta and give time of eruption of each.
7. What condition does (a) a decrease of hydrochloric acid indicate? (b) An increase?
8. Describe eczema and give treatment.

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9. Give the Diazo-reaction test. What does it diagnose and prognose?

10. Discuss immunity, giving attention to acquired immunity, to toxin immunity, and to the theories of the nature of immunity.

SURGERY.

1. Differentiate shock and hemorrhage, postoperative, as to diagnosis and treatment.

2. Give surgical anatomy of kidney.

3. Give treatment of compound fracture of upper third of femur.

4. Give indications for operative interference in cholelithiasis.

5. Give treatment of cancer of sigmoid flexure of the colon.

6. Describe a method of lateral intestinal anastomosis.

7. What are the blood findings in pyogenic osteomyelitis?

8. Give indications for enucleating eye.

9. Give common sources of wound infection.

10. Describe resection of shoulder joint.

GYNECOLOGY.

1. Describe the structure of the perineal body.

2. Enumerate three causes for suppression of menses.

3. Differentiate pelvic hematocoele from pelvic abscess.

4. What may result from lacerated perineum?

5. Describe the technique of washing the urinary bladder and in what conditions it is indicated.

DISEASES OF CHILDREN.

1. Discuss briefly icterus neonatorum.

2. Write a prescription for modification of cow's milk for a child three months old.

3. Give etiology of otitis media.

4. Give etiology of infantile endocarditis.

5. Give diagnosis and differential features of basilar meningitis.

OBSTETRICS.

1. Describe the blastodermic vesicle.

2. Name some of the causes and some dangers incident to protracted labor.

3. Make a diagnosis of syphilis of the newborn; state something concerning the prognosis.

4. What conditions contraindicate the operation of version?

5. What changes in the blood are produced by pregnancy?

6. How is labor usually influenced by a kyphotic pelvis?

7. The presenting part is well engaged in the pelvis;

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the anterior shoulder is felt to the left but near the median line; the fetal heart sounds are heard about midway on a line from the left anterior superior spine to the umbilicus; what are the probable presentation and position?

8. What measures would you suggest to overcome uterine inertia?

9. How soon should the cord be ligated? Give your reasons.

10. How recognize tetanus neonatorum?

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

OHIO STATE BOARD OF MEDICAL REGISTRATION AND EXAMINATION.

ANATOMY.

1. *Mucous membranes* consist of an epithelial surface containing glands, a basement membrane, supporting connective tissue, with blood and nerve supply. They are found lining passages by which the internal parts connect with the exterior of the body.

Serous membranes consist of a single layer of endothelial cells, with no glands, upon a connective tissue membrane, with blood-vessels, nerves, and lymphatics. They form closed sacs lining visceral cavities (with the exception of the peritoneal cavity in the female).

7. *The features of the bony skeleton which characterize sex*, are: (1) In the male the bones are, as a rule, stronger, larger and heavier, and the prominences, ridges, and lines are more distinct; (2) the skull in the male looks more mature, and less like that of a child, and the glabella is more prominent; (3) in the female the sternum is shorter, the capacity of the thorax is less, and the upper ribs are more movable; (4) in the female the clavicle is shorter, thinner, smoother, and less curved; (5) in the female the sacrum is relatively wider, less curved, and is directed more obliquely backwards; (6) in the female the pelvis is wider, shallower, has an oval inlet, has a larger subpubic angle, the obturator foramen is triangular (oval, in the male), the tuberosities of the ischia are everted; (7) the inclination of the shafts of the femora from the pelvis to the knee is greater in the female.

PHYSIOLOGY.

2. *Functions of the pneumogastric nerve*: "Throughout its whole course the vagus contains both sensory and motor fibers. To summarize the many functions of this nerve . . . it may be said that it supplies (1)

MEDICAL RECORD.

motor influence to the pharynx and esophagus, stomach, and intestines, to the larynx, trachea, bronchi, and lungs; (2) *sensory* and, in part, (3) *vasomotor* influence, to the same regions; (4) *inhibitory* influence to the heart; (5) *inhibitory* afferent impulses to the *vasomotor center*; (6) *excito-secretory* to the salivary glands; (7) *excito-motor* in coughing, vomiting, etc." (Kirkes' *Physiology*.)

3. In the *embryo*, the red blood corpuscles are derived from cells in the vascular area of the mesoblast; in the *adult*, they are derived chiefly from the red marrow of bones, also from the spleen. Their function is to carry oxygen from the lungs to the tissues of the body; this is accomplished by the hemoglobin, which has a great affinity for oxygen.

5. Foods are classified as follows:

- | | |
|--------------|--|
| I. Inorganic | { Water.
{ Salts. |
| II. Organic | { Non-nitrogenous { Carbohydrates.
{ Fats.
{ Nitrogenous—Proteids. |

The constituents and functions are shown in the following table adapted from Notter and Firth's *Hygiene*:

FOOD.	FUNCTIONS.
<i>Proteids.</i>	
1. All substances containing nitrogen, of a composition identical with, or nearly that of albumin; proportion of N to C being nearly as 2 to 7.	Formation and repair of tissues and fluids of the body. Regulation of the absorption and utilization of oxygen. May also form fat and carbohydrate, and yield energy sometimes. In most foods the above, both animal and vegetable, are largely converted into albumoses and peptones during digestion.
2. Substances containing a larger proportion of N are apparently less nutritious; proportion of N to C about 2 to 5½.	These perform the above functions less perfectly, or only under particular circumstances.
3. Extractive matters, such as are contained in the juice of the flesh.	These substances appear essentially as regulators of digestion and assimilation, especially with reference to the gelatin group.

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FOOD.	FUNCTIONS.
<i>Carbohydrates.</i>	
Substances containing no N, but made up of C, H and O; the O being exactly sufficient to convert all the H into H_2O .	Production of energy and animal heat by oxidation. Form fats and possibly some proteids.
<i>Fats.</i>	
Substances containing no N, but made up of C, H and O; the proportion of O being <i>less</i> than sufficient to convert all the H into H_2O .	Supply of fatty tissues, nutrition of nervous system; supply of energy and animal heat by oxidation.
<i>Salts.</i>	
	Support of bony skeleton, supply of HCl for digestion, regulation of energy and nutrition.

7. Proteids are a group of organic bodies which are never absent from living animal or vegetable cells, to whose "life" they are indispensable. They are composed of carbon, hydrogen, oxygen, and nitrogen; most of them also contain sulphur, some contain phosphorus, and others iron, copper, or iodine. The molecule is very complex and its constitution is unknown.

8. The quantity of urine secreted depends upon:—the amount of liquids ingested, the amount of perspiration secreted, the temperature and moisture of the surrounding atmosphere, increase or decrease of blood pressure, and the presence or absence of certain diseases such as diabetes, nephritis, etc.

CHEMISTRY.

1. Potassium permanganate is a very active oxidizing agent; and its action as a disinfectant is due to the oxidation of the organic matter with which it comes in contact.

2. *A simple test for organic impurities in water:* "Put a pint of water into a *perfectly clean* quart bottle, cork and shake strongly, remove the cork, and inhale the air of the bottle. If the water be much contaminated, and if the observer's sense of smell be acute, an offensive odor will be observed. This method is *quite* rough, and only very bad water will produce an odor."—(Witthaus' *Essentials of Chemistry*.)

3. The reaction of cow's milk is amphoteric or alkaline

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when freshly drawn, but soon becomes acid; the reaction of mother's milk is alkaline or amphoteric.

4. The *inorganic constituents of the gastric juice*, are: water; hydrochloric acid; chlorides of sodium, potassium, and calcium; and phosphates of calcium, magnesium, and iron.

5. *Urea* has the formula $\text{CO}(\text{NH}_2)_2$; it "crystallizes in transparent needles or four-sided prisms, without Aq; permanent in air; odorless, having a cooling, slightly bitter taste, resembling that of saltpeter. Soluble in an equal weight of cold water, very soluble in boiling water and in five parts of cold or one part of hot alcohol, the solutions being neutral in reaction. At 248°F . it melts, and slightly above that temperature is decomposed. It is found in the blood, chyle, lymph, humors of the eye, saliva, perspiration, bile, milk, serous fluids, amniotic and allantoic fluids, and especially in the urine.

"It is the principal product of the oxidation of protein substances in the animal body, and is the form in which most of the nitrogen is excreted."

Uric acid has the formula $\text{C}_5\text{H}_4\text{N}_4\text{O}_6$; it "crystallizes in small, colorless, rhombic, rectangular, or hexagonal plates, or in rectangular prisms. As crystallized from the urine, it is more or less colored by the urinary pigments, and the angles of the crystals are rounded to produce lozenge shapes, which are arranged in bundles, crosses, or daggers.

"It is odorless, tasteless, very sparingly soluble in H_2O , insoluble in alcohol and ether, soluble without decomposition in H_2SO_4 or HCl . Moist uric acid has an acid reaction. It is a dibasic acid."—(Witthaus' *Essentials of Chemistry*.)

6. HYDROGEN DIOXIDE: *Formula*, H_2O_2 .

Properties: It is a colorless, syrupy liquid, heavier than water, with a metallic taste; it is a powerful oxidizing agent, and a good bleacher and disinfectant.

Uses: Disinfectant, antiseptic, and bleaching agent; as an oxidizing agent; for renovating old oil paintings, and bleaching hair.

7. The most important chemical tests in the analysis of urine, are: the tests for albumin (heat, and nitric acid test); sugar (Fehling's, Trommer's, Boettger's, Nylander's, phenylhydrazin); bile, blood, indican, chlorides, phosphates; and quantitative for urea and uric acid.

8. Cream of tartar is monopotassic tartrate; Glauber's salt is sodium sulphate; Epsom salt is magnesium sulphate; copperas is ferrous sulphate; sugar of lead is lead acetate; common salt is sodium chloride.

9. In poisoning by corrosive sublimate, white of egg

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should be administered in not too great a quantity; and this should be followed by an emetic.

10. (1) *Oxalic acid*, occurs as oxalate of K, Na, Ca, etc., in the juices of rhubarb, sorrel, oak, etc. (2) *Malic acid* occurs in apples, pears, cherries, etc. (3) *Citric acid* is obtained from lemon juice. (4) *Gallic acid* is obtained from nutgalls.

MATERIA MEDICA AND THERAPEUTICS.

1. Senna is obtained from the leaves of the *Cassia acutifolia*. It is *indicated* in constipation, as a cathartic and a laxative.

Preparations: Confection, syrup, fluid extract, compound infusion; also compound licorice powder.

2. Three drugs that may be used to increase the flow of urine: water, spirit of nitrous ether, and caffeine.

3. For *chronic eczema of the gouty type*:

Rx

Potassii acetatis

Potassii citratis aa ʒi.

Aquæ destillatæ q.s. ad ʒiv. Misce.

Sig.: One tablespoonful in water, after each meal.

4. In acute opium poisoning, by the mouth: Wash out the stomach with a dilute solution of potassium permanganate, and leave about three-quarters of a pint of the solution in the stomach. Maintain respiration, and give strong coffee.

5. Alkalies given before meals increase the secretion of hydrochloric acid in the stomach; if given after meals, some of the acid secreted is neutralized.

6. Ammonium carbonate may be used: as a gastric stimulant, as a cardiac and general stimulant, as an emetic, an expectorant, and a carminative.

It should be exhibited in small doses, which can be frequently repeated if necessary.

8. In diabetic coma a full dose of magnesium sulphate may be given.

9. *Three styptics*: Alum, silver nitrate, and tannic acid.

10. *Some therapeutic aims of the hot pack*: To cause sweating, to remove poisons and fluid in renal disease and uremia, to relax muscular spasm, to relieve excitement and insomnia of nervous origin.

PHYSICAL DIAGNOSIS.

1. Decreased resonance of the percussion sound over the lung may denote: Consolidation of the lung, presence of a tumor, fluid in the pleural cavity, collapse of the lung, phthisis, pneumonia, abscess of lung.

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2. Dullness or flatness in Traube's area denotes effusion into the left pleural cavity.
3. Amphoric resonance is present in: pneumothorax, or a cavity in the lung.
4. Cracked-pot sound may be due to: a cavity in the lung communicating with a bronchus, pneumothorax connected by a fistula to a bronchus; it may be present in pneumonia.
5. Bronchial breathing is present in: Consolidation of the lung, pneumonia, tuberculosis, compression of the lung by pleural effusion.
6. Friction sounds are found in: pleurisy or pericarditis; also in hepatic or subphrenic abscess.
7. *Caput Medusæ* indicates portal obstruction, and is present in: ascites, tumors of abdomen, cirrhosis or tumor of liver.
8. *Tachycardia* is present in: Fevers, valvular cardiac lesions, phthisis, exophthalmic goiter, chlorosis, pernicious anemia, locomotor ataxia, arthritis deformans, sexual and alcoholic excesses.
10. The murmur of mitral insufficiency is soft, blowing, systolic, heart loudest at the apex, and is transmitted through the left axilla and posteriorly to the angle of the left scapula. The second pulmonic sound is accentuated.

PRACTICE AND PATHOLOGY.

3. Failure of compensation in chronic valvular disease of the heart may be marked by: Dyspnea, hemoptysis, cough, chronic bronchial catarrh; congestion of the stomach, intestines, and liver; dyspepsia, gastritis, enlarged spleen, ascites; cyanosis; dropsy; scanty and albuminous urine, with casts; clubbed fingers; vertigo, headache, or syncope.

4.

	Amount of Urine Excreted in 24 Hours.	Specific Gravity.
In health	About 50 ounces	About 1015 to 1025
Acute nephritis	Greatly Diminished	Raised
Chronic parenchymatous nephritis	Diminished	S o m e w h a t raised at first, then lower.
Chronic interstitial ne- phritis	Increased	Low
Diabetes mellitus	Enormously increased	Usually raised.

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7. (a) *Decrease* of hydrochloric acid in the gastric juice indicates chronic gastritis, gastric dilatation, beginning carcinoma. (b) *Increase*, denotes gastric ulcer.

9. For the diazo reaction two solutions are required: (1) A saturated solution of sulphanilic acid in a mixture of 50 c.c. of hydrochloric acid and 950 c.c. of water, and (2) a 0.5 per cent. solution of sodium nitrite.

To make the test, 1 c.c. of (2) is added to 40 c.c. of (1), and the mixture thoroughly shaken. Equal quantities of this mixture and the urine to be tested are shaken together in a test tube, and 1 c.c. of ammonia is then floated upon the surface, when, in an affirmative result, a red band is formed at the junction of the fluids.

Its diagnostic value is uncertain. Von Jaksch "disclaims for this test any clinical importance whatever." Others have claimed that the reaction is pathognomonic of typhoid; but it has been found in other diseases besides typhoid—namely, phthisis, pneumonia, measles, scarlet fever, smallpox, and malaria.

As to *prognosis* it is said: that if the reaction is not found in the second or third week of a typhoid fever, the case is a mild one; (2) in phthisis a constant reaction implies an incurable case.

SURGERY.

8. The *indications, for enucleation of the eye*, are:

"(1) Injuries of the ciliary region, when the eye is completely blind, or the traumatism so extensive that the form of the eyeball cannot be preserved; (2) traumatic iridocyclitis, to prevent or cure sympathetic ophthalmia; (3) severe pain in a blind eye; (4) irido-cyclitis, phthisis bulbi, and glaucoma, when accompanied by severe pain or inflammatory symptoms, and when the eye is blind or is certain to become so; (5) malignant tumors, either intra-ocular or epiocular, if they cannot be removed with retention of the eyeball; (6) anterior staphyloma, if the eye is blind, troublesome, and disfiguring; (7) panophthalmitis, after the suppurative stage is passed; (8) foreign bodies in the eye when they cannot be removed and cause irritation, or the eye is blind."—(May's *Diseases of the Eye*.)

GYNECOLOGY.

2. *Three causes for the suppression of menses*: (1) Pregnancy; (2) chlorosis; (3) imperfect development of the genital organs.

4. *Lacerated perineum* may be followed by local tenderness, irritable scar, reflex disturbances, subinvolution of the uterus, rectocele, cystocele, prolapse of the uterus, and incontinence of feces.

MEDICAL RECORD.

OBSTETRICS.

1. As soon as the nuclei of the germ-cell and sperm-cell have conjugated the ovum divides into two cells, called *blastomeres*. These divide and divide again until a mass of small cells results, called the *morula*, which is not much larger than the original ovum. These small cells now become differentiated into larger granular elements in the center and smaller clear cells at the periphery, the two being separated by fluid. The latter accumulates until the morula becomes converted into a vesicle, the wall being formed of a single layer of the small peripheral cells, the central mass floating free in the fluid, attached to the outer layer at only one point. The embryo is developed from this central mass. It is at this stage that the ovum is called the *blastodermic vesicle*.

4. *Cephalic version is contraindicated in:* (1) Contracted pelvis; (2) when rapid delivery is required; (3) rigid uterus; (4) immobility of the fetus.

Podalic version is contraindicated in: (1) Extreme contraction of the pelvis; (2) impaction of the presenting part; (3) when the retraction ring of Bandl rises two inches or more above the pubes.

5. *In pregnancy:* the total quantity of blood is increased; the white corpuscles are increased, as is also the hemoglobin; the red corpuscles are said by some to be increased, by others to be decreased; there is an increase of fibrin and extractives.

STATE BOARD EXAMINATION QUESTIONS.

OKLAHOMA TERRITORIAL MEDICAL EXAMINING BOARD,

ANATOMY.

1. Describe the femur, its articulations and what portions of it are not covered by periosteum.

2. Give the number of sutures and fontanelles in the skull, and by what and how is each formed?

3. Where is the reticular elastic cartilage found, and locate the coracoid and acromion process.

4. Give origin, insertion and uses of the following muscles; trapezius, supinator-longus, latissimus-dorsi, internal oblique and the gracilis.

5. Describe the right ventricle of the heart, give its capacity and name the valves connected with the ventricle.

6 and 7. Locate and give uses of the Fallopian and Eustachian tubes, lacrymal duct, prostate gland, crystalline lens, antrum of Highmore, clitoris, spleen, ureter, suprarenal capsule, the abdominal and thoracic cavities.

MEDICAL RECORD.

8. Give origin and branches of inferior dental and the mastoid arteries.

9. Name the bones, main muscles, arteries, nerves, and other fascia gone through in amputating leg at the thigh.

10. Enumerate the changes the bones of the lower jaw undergo in very aged persons.

PHYSIOLOGY.

1. Define special and comparative physiology.

2. Name the digestive juices and the organs that produce them, and give their actions on bread, eggs, milk, and butter.

3. Name the ferments found in the digestive juices and give source of glycogen and dextrose.

4. Give the composition of normal and healthy urine, and of urine in a case of diabetes mellitus.

5. Give structure and functions of the liver and kidneys.

6. Where and how is urea formed, and give cause of rigor mortis.

7. How do the products of digestion find their way into the blood?

8. What would be the results of eating in excess of albuminous, oleaginous, and farinaceous foods.

9. Give the changes of the air in respiration and the respiratory changes in the blood.

10. Name the heat-producing tissues of the body.

CHEMISTRY AND URANALYSIS.

1. Define (a) chemistry, (b) matter, (c) atom, (d) molecule, (e) element.

2. Differentiate between chemical and physical changes in matter and illustrate.

3. Define chemism, atomic weight, specific gravity.

4. Name the alkaline elements; give symbols for the gaseous elements.

5. Name two *ic* and two *ous* salts of mercury and give formula.

6. Give common name, formula, and uses of four zinc salts.

7. Give common names of following formula, CO_2 , H_2O_2 , FeSO_4 , NaCl , HgCl_2 .

8. Give chemical name and formula of borax, marble, blue vitriol, Rochelle salts, oil of vitriol.

9. Discuss arsenic, mention its properties, compounds, and uses.

10. Name four normal, and give in detail tests for four abnormal constituents of urine.

MEDICAL RECORD.

MATERIA MEDICA AND THERAPEUTICS.

1. Give therapeutics of quinine, iron, strychnine, digitalis.
2. Give dosage of remedies you use in pneumonia, membranous croup, typhoid fever.
3. Give dosage and indications for four remedies you use in jaundice, rheumatism, malarial fever.
4. Give habitat, preparation, dosage, and uses of twelve leading remedies you carry in your medicine case.
5. Give indications that guide you in the use of each of the remedies you mention in answer to previous question.

PHYSICAL DIAGNOSIS AND PATHOLOGY.

1. Name the topographic lines of the thorax, outline and locate the heart's area of absolute dullness and the upper border of the normal liver.
2. Describe the usual course of parenchymatous nephritis, also interstitial nephritis. In what class of patients is the latter most frequently observed? How would you differentiate one from the other?
3. Under what conditions would occur a physiological leucocytosis? Under what pathological conditions would you expect to find a polymorphonuclear leucocytosis? A lymphocytosis?
4. Designate which component part of the spinal cord is involved in locomotor ataxia and describe the metamorphosis of structure characterizing the pathological process.
5. What pathological changes occur in cirrhosis of the liver?
6. Give differential diagnosis between septicemia and pyemia.
7. Give the principal diagnostic points of difference between mitral regurgitation and aortic regurgitation.
8. Give differential diagnosis between scarlet fever and erysipelas in their early stages.
9. Give differential diagnosis between phlebitis and lymphangitis.
10. Give differential diagnosis between variola and varicella.

PRACTICE OF MEDICINE.

1. What are the intrinsic and extrinsic causes of dilatation of the heart with broken compensation? How would you treat the latter condition when very extreme?
2. Describe Bell's paralysis, Cheyne-Stokes respiration.
3. What are the early manifestations of pulmonary tuberculosis and give your method of management in a case.
4. Give the etiology, pathology, symptoms, treatment,

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dietetic, medicinal, hygienic and prophylactic of enterocolitis.

5. Give symptoms and treatment of acute ptomaine poisoning.

6. Give symptoms and treatment of pulmonary edema.

7. Give cause, symptoms, and treatment of herpes zoster.

8. Name one infectious and one contagious disease and give diagnosis of the diseases named.

9. Describe a case of uremic coma and your treatment for same.

10. Give symptoms and diagnosis and treatment of follicular tonsillitis.

OBSTETRICS AND GYNECOLOGY.

1. Define menstruation, give duration, age of appearance and cessation, and abnormal manifestations.

2. Name and give measurements of female pelvis; of fetal head.

3. Give briefly the anatomy of uterus, ovaries, placenta.

4. Give theory of menstruation; of conception.

5. Name the three important forms of hemorrhage met with in obstetric practice and give causes and treatment of each.

6. Define ectopic gestation, caput succedaneum, vitellus, amnion.

7. Into what stages is labor divided, and where does each stage begin and end?

8. How would you treat mastitis, puerperal eclampsia?

9. Give in detail technique of repairing laceration of perineum involving floor of vagina.

10. How would you prepare your patient for delivery and yourself for attendance in a case of labor?

SURGERY.

1. Diagnose, give prognosis and treatment of the following diseases: Erysipelas, rhinitis, pyemia, and traumatic or surgical fever.

2. Describe and differentiate the following, viz.: Contusion and laceration, an incised, punctured, lacerated, gunshot and poisoned wounds.

3. Give signs of fracture, dislocation, reduction, and the process of repair.

4 and 5. Give differential diagnosis and treatment of fracture of the surgical neck, capsular fracture of the femur, and a case of hip joint disease.

6. Define and give treatment of tinea-versicolor, tinea-circinata, herpes zoster, and scabies.

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7. How would you diagnose? Give prognosis and treatment of septicemia, pyemia, and septicopyemia.
8. Give differential diagnosis between coma the result of an injury and that produced by opium poisoning, alcoholic intoxication, apoplexy, and uremic poisoning.
9. Describe and give treatment of hydrocele, hypospadias, varicocele, hematocele, and epispadias.
10. Give symptoms, prognosis, and technique of the operation for an ectopic gestation, or an extrauterine pregnancy.

MEDICAL JURISPRUDENCE.

1. In a medicolegal sense, what constitutes a dying declaration and what is necessary to make it evidence in a court of justice, and how should it be taken?
2. Determine in a case of supposed infanticide whether the child was still-born or killed after birth.
3. What are the symptoms and treatment of corrosive sublimate poisoning?
4. At what period will a body float after being drowned?
5. In a case of opium poisoning, what are the post-mortem symptoms?
6. What is malpractice?
7. How would you treat a patient suffering from poisoning by coal gas?
8. What are the symptoms and treatment for poisoning by the castor bean and what is considered a lethal dose?
9. What are symptoms of poisoning by wood alcohol and treatment for same?
10. Give symptoms and treatment for poisoning by turpentine taken internally.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

OKLAHOMA TERRITORIAL MEDICAL EXAMINING BOARD.

ANATOMY.

3. Reticular elastic cartilage is found in the external ear, in the Eustachian tube, in the epiglottis, in the cartilages of Santorini and of Wrisberg in the larynx.
9. *Bone:* the femur. *Main muscles:* rectus femoris, vastus externus, crureus, vastus internus, biceps, semitendinosus, semimembranosus, adductor magnus, gracilis, adductor longus, sartorius. *Arteries:* femoral, profunda femoris. *Nerves:* great sciatic, small sciatic, external cut-

MEDICAL RECORD.

aneous, middle cutaneous. *Fascia*: superficial fascia, fascia lata.

10. "The changes which the lower jaw undergoes after birth relate (1) to the alterations effected in the body of the bone by the first and second dentitions, the loss of teeth in the aged, and the subsequent absorption of the alveoli; (2) to the size and situation of the dental canal, and (3) to the angle at which the ramus joins with the body.

"*At birth* the bone consists of lateral halves, united by fibrous tissue. The body is a mere shell of bone, containing the sockets of the two incisor, the canine, and the two temporary molar teeth, imperfectly partitioned from one another. The dental canal is of large size, and runs near the lower border of the bone, the mental foramen opening beneath the socket of the first molar. The angle is obtuse (175 degrees), and the condyloid portion nearly in the same horizontal line with the body; the neck of the condyle is short, and bent backward. The coronoid process is of comparatively large size, and situated at right angles with the rest of the bone.

"*After birth* the two segments of the bone become joined at the symphysis, from below upward, in the first year; but a trace of separation may be visible in the beginning of the second year near the alveolar margin. The body becomes elongated in its whole length, but more especially behind the mental foramen, to provide space for the three additional teeth developed in this part. The depth of the body becomes greater, owing to increased growth of the alveolar part, to afford room for the fangs of the teeth, and by thickening of the subdental portion, which enables the jaw to withstand the powerful action of the masticatory muscles; but the alveolar portion is the deeper of the two, and, consequently, the chief part of the body lies above the oblique line. The dental canal after the second dentition is situated just above the level of the mylohyoid ridge, and the mental foramen occupies the position usual to it in the adult. The angle becomes less obtuse, owing to the separation of the jaws by the teeth. (About the fourth year it is 140 degrees.)

"*In the adult* the alveolar and basilar portions of the body are usually of equal depth. The mental foramen opens midway between the upper and lower border of the bone, and the dental canal runs nearly parallel with the mylohyoid line. The ramus is almost vertical in direction, and joins the body nearly at right angles.

"*In old age* the bone becomes greatly reduced in size;

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for with the loss of the teeth the alveolar process is absorbed, and the basilar part of the bone alone remains; consequently, the chief part of the bone is *below* the oblique line. The dental canal, with the mental foramen opening from it, is close to the alveolar border. The rami are oblique in direction, the angle obtuse, and the neck of the condyle more or less bent backward." (Gray's *Anatomy*.)

PHYSIOLOGY.

1. *Special Physiology* treats of the nature and function of particular organs, as the lungs, heart, etc.

Comparative Physiology treats of the study and comparison of the physiology of different animals (or plants).

2. The digestive juices are: (1) Saliva, produced by the salivary glands (parotid, submaxillary and sublingual). (2) Gastric juice, produced by the stomach. (3) Pancreatic juice, produced by the pancreas. (4) Succus entericus, produced by the small intestine. (5) Bile, produced by the liver.

Bread consists of proteid, fat, and carbohydrate; *eggs* of proteid and fat; *milk* of proteid, carbohydrate, and fat; *butter* of fat, and a little proteids. They all contain water.

For the effect of the digestive juices on these constituents, see next answer.

3.—

	FERMENT	FUNCTION
Saliva.....	Ptyalin.....	Changes starch into dextrin and sugar.
	Pepsin ..	Changes proteids into proteoses and peptones in an acid medium.
Gastric juice.....	A curdling ferment.	Curdles the casein of milk.
	Trypsin.....	Changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; in an alkaline medium.
Pancreatic juice....	Amylopsin.....	Converts starches into maltose.
	Steapsin.....	Emulsifies and saponifies fats.
	A curdling ferment..	Curdles the casein of milk.

Glycogen is formed in the liver, chiefly from the carbohydrates of the food, and also from the proteids.

Dextrose is derived from the digestion of starch and cane sugar.

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4. The following table (from Dunglison's *Medical Dictionary*) gives the average composition of normal urine:

(PARTS IN 1000.)		VOIDED PER DAY	
		Grains	Grams
Water.....	950.00		
Urea.....	28.00	520.80	35.00
Uric acid.....	0.60	11.16	0.75
Hippuric acid.....	0.35	6.51	0.44
Creatinin.....	0.65	12.00	0.81
Extractives.....	8.00	148.80	10.00
Sodium chloride.....	8.00	148.80	10.00
Phosphoric acid.....	2.00	37.20	2.50
Sulphuric acid.....	1.25	23.45	1.56
Lime (CaO).....	0.25	4.05	0.31
Magnesia (MgO).....	0.30	5.58	0.37
Potash (K ₂ O) and soda, (Na ₂ O).....	0.60	11.16	0.75
Total.....	1000.00	930.20	62.49

In diabetes mellitus the total quantity voided is greatly increased, the specific gravity is higher, and it contains amounts of sugar varying from an ounce to two pounds per day; the urea and uric acid are also increased.

5. The functions of the *liver* are: (1) The secretion of bile, (2) the formation of glycogen, (3) the formation of urea and uric acid, (4) the manufacture of heat, and (5) the conversion of poisonous and harmful into inert material.

The functions of the *kidney* are: (1) The secretion of urine, and (2) the secretion of an "internal secretion."

6. Urea is formed in the liver, from proteids, by a process of hydrolysis and of oxidation.

Rigor mortis is caused by the lowering of the body temperature and the coagulation of the albumin of the muscles.

7. By absorption through the portal vein and the lacteals. The portal vein absorbs the greater part of the water, salts, peptones, sugar, and soaps, and a trace of fats. The lacteals absorb the greater part of the fat, some water, and peptones, and a trace of salts and sugar.

8. "*Albuminous food* in excess promotes the arthritic diathesis, manifesting itself as gout, gravel, etc. *Oleaginous food* in excess gives rise to the bilious diathesis. *Farinaeous food*, when long continued in excess, favors the rheumatic diathesis by the development of lactic acid."—(Brubaker.)

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9. The changes of the air in respiration are shown in the following table:

	INSPIRED AIR	EXPIRED AIR
Oxygen.....	21 per cent.....	16.6 per cent.
Nitrogen.....	79 per cent.....	79 per cent.
Carbon dioxide.....	0.04 per cent.....	4.4 per cent.
Other gases.....	Rare.....	Often present.
Water vapor.....	Variable.....	Saturated.
Temperature.....	Variable.....	That of body.
Volume.....	Varies.....	Diminished.
Bacteria.....	Always present.....	None.
Dust.....	Always present.....	None.

The respiratory changes in the blood: (1) In the *lungs*, the blood is changed in color, gains oxygen, loses carbon dioxide, loses heat, and loses watery vapor. (2) In the *capillaries of the body*, the blood loses oxygen and receives carbon dioxide.

10. The heat-producing tissues of the body are: (1) The muscles, during contraction; (2) the secreting glands, during functional activity; (3) the brain, during mental activity; (4) all the tissues of the body are capable of adding to the total amount of body heat, but the first three named are the chief contributors.

CHEMISTRY AND URANALYSIS.

1. *Chemistry* is that branch of science which treats of the composition of substances, their changes in composition, and the laws governing such changes.

Matter is that which occupies space, or is evident to one or more of the senses.

An atom is the smallest quantity of an element that can enter into chemical action.

A molecule is the smallest quantity of any substance (element or compound) that can exist in a free state.

An element is a substance which cannot by any known means be split up into two or more dissimilar substances.

2. "A bar of soft iron may be made to emit light when heated, or sound when caused to vibrate, or magnetism when under the influence of an electric current. Under the influence of these *physical forces* the iron suffers no change in composition, and, on cessation of the action of the inciting force the iron returns to its original condition. But if the iron be heated in an atmosphere of oxygen, both the iron and a part of the oxygen disappear, and a new substance, a new chemical species, is produced, having properties of its own, different from those of either the iron or the oxygen. In this case there has been *chemical*

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action, causing change of composition, as the new substance contains both iron and oxygen. The result of such action is, moreover, permanent, and the new product continues to exist, until modified by some new manifestation of chemical action."—(Witthaus' *Manual of Chemistry*.)

3. *Chemism* is the force which holds together the atoms in a molecule.

Atomic weight is the weight of an atom of an element as compared with the weight of an atom of hydrogen.

Specific gravity is the weight of a substance compared with the weight of an equal volume of another substance taken as a standard.

4. The alkaline elements are: (1) The alkali metals: lithium, sodium, potassium, rubidium, cesium, and (2) the metals of the alkaline earths: calcium, barium, strontium.

The symbols of the gaseous elements are: H, O, F, Cl, N, He, Ne, A, Kr, and Xe.

5. Mercuric chloride, HgCl_2 ; mercuric oxide, HgO ; mercurous chloride, Hg_2Cl_2 ; mercurous oxide, Hg_2O .

6. (1) Zinc chloride, butter of zinc, ZnCl_2 , used as a caustic, disinfectant, antiseptic, and for embalming.

(2) Zinc sulphate, white vitriol, ZnSO_4 , used as a styptic, astringent, and emetic.

(3) Zinc oxide, tutty, ZnO , used in the arts as a pigment.

(4) Zinc carbonate, calamine, ZnCO_3 , used as a dusting powder and astringent.

7. CO_2 , common name carbonic acid; H_2O_2 , common name peroxide of hydrogen; FeSO_4 , common name green vitriol, or copperas; NaCl , common name table salt; HgCl_2 , common name corrosive sublimate.

8.—

	CHEMICAL NAME	FORMULA
Borax.....	Disodic tetraborate.....	$\text{Na}_2\text{B}_4\text{O}_7$
Marble.....	Calcium carbonate.....	CaCO_3
Blue vitriol.....	Cupric sulphate.....	CuSO_4
Rochelle salts.....	Potassium sodium tartrate...	$\text{KNaC}_4\text{H}_4\text{O}_6$
Oil of vitriol.....	Sulphuric acid.....	H_2SO_4

9. Arsenic is an element, with atomic weight of 75, molecular weight 300, valence three or five; the molecule contains four atoms. It occurs chiefly in combination in orpiment, realgar, mispickel or iron pyrites. It is a crystalline solid or an amorphous powder; the vapor has an odor of garlic; it is insoluble in water; it unites with nascent hydrogen; it burns in oxygen; on being heated in air it is converted into arsenic trioxide, As_2O_3 . It is used in

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the manufacture of shot, flypapers, fireworks, and pigments. Its chief compounds are: Hydrogen arsenide, arsenic trichloride, arsenic trioxide, arsenic pentoxide, arsenous acid, arsenic acid, arsenic bisulphide, arsenic trisulphide, arsenic pentasulphide.

10. Four normal constituents of urine: Water, urea, uric acid, and sodium chloride.

Test for (1) *Albumin*: The urine must be perfectly clear. If not so, it is to be filtered, and if this does not render it transparent it is to be treated with a few drops of magnesia mixture, and again filtered. The reaction is then observed. If it be acid, the urine is simply heated to near the boiling point. If the urine be neutral, or alkaline, it is rendered faintly acid by the addition of dilute acetic acid, and heated. If albumin be present, a coagulum is formed, varying in quantity from a faint cloudiness to entire solidification, according to the quantity of albumin present. The coagulum is not redissolved upon the addition of HNO_3 .

Test for (2) *Sugar*: Render the urine strongly alkaline by addition of Na_2CO_3 . Divide about 6 cc. of the alkaline liquid in two test tubes. To one test tube add a very minute quantity of powdered subnitrate of bismuth, to the other as much powdered litharge. Boil the contents of both tubes. The presence of glucose is indicated by a dark or black color of the bismuth powder, the litharge retaining its natural color.

Test for (3) *Acetone*: Add a few drops of a freshly prepared solution of sodium nitroprussid, and then KHO or NaHO solution, when, in the presence of acetone, the liquid is colored ruby red, and on supersaturation with acetic acid changes to purple.

Test for (4) *Indican*: The urine is mixed with one-fifth its volume of 20 per cent. solution of lead acetate and filtered. The filtrate is mixed with an equal volume of fuming hydrochloric acid containing 3:1000 of ferric chlorid, a few drops of chloroform are added, and the mixture strongly shaken one to two minutes. With normal urine the chloroform remains colorless, or almost so; but if an excess of indoxyl compounds be present the chloroform is colored blue, and the depth of the color is a rough indication of the degree of the excess.

—(From Witthaus' *Essentials of Chemistry*.)

PHYSICAL DIAGNOSIS AND PATHOLOGY.

1. The topographic lines of the thorax are *vertical lines* and *horizontal lines*, as follows:

"The *vertical lines* are from front to back: (1) The

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midsternal line and its prolongation upward. (2) The *sternal line*, corresponding to the lateral border of the sternum. (3) The *parasternal line*, midway between (2), and (4) The *mamillary or nipple line*, which, even in the male thorax, does not always pass through the nipple, but may be more exactly defined as a vertical line dropped from the center of the clavicle. (5) The *anterior axillary line*, drawn through the point at which the great pectoral muscle cleaves the chest when the arm is raised sidewise to a horizontal line. (6) The *middle axillary line*, drawn through midway between (5) and (7) The *posterior axillary line*, which is drawn through the point at which the latissimus dorsi leaves the chest, the arm being raised as in (5). (8) The *scapular line*, drawn through the inferior angle of the scapula. (9) The *midspinal line*.

"The *horizontal lines* are, in front and at the side, from above downward: (1) A line running from the cricoid cartilage to the outer end of the clavicle. (2) The line of the clavicles. (3) A line through the third chondrosternal articulation. (4) A line through the sixth chondrosternal articulation. Posteriorly they are: (5) A line through the spines of the scapulæ. (6) A line through the inferior angles of the scapulæ. (7) A line through the spine of the twelfth dorsal vertebra."—(Butler's *Diagnostics of Internal Medicine*.)

3. A *physiological leucocytosis* is found: In the newborn, after parturition, after exertion, after a cold bath or massage, during pregnancy, and during digestion.

A *polymorphonuclear leucocytosis* is found in all acute inflammatory diseases, in certain of the acute infectious diseases, and accompanying the cachexia of malignant disease.

A *lymphocytosis* is found in lymphatic leukemia, and sometimes in sarcoma, and whooping cough.

4. In locomotor ataxia the posterior columns of the spinal cord and the posterior nerve roots are involved.

The process is destructive and progressive; it is not a simple wasting, although the nerve fibers are atrophied, but it is characterized by irritation, changes in the axis cylinders, overgrowth of the connective tissue, and sometimes congestion. The spinal ganglia may be affected; the membranes over the affected parts are adherent and opaque.

6. *Septicemia* begins with a rigor, followed by a rise of temperature up to about 104° F., which remains constant. The pulse is weak and progressively rapid; there is anorexia and constipation, which is followed by diarrhea; the urine contains albumin; the temperature may become sub-

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normal. There are no repeated rigors and no secondary (metastatic) abscesses.

Pyemia begins with a rigor, which may last for half an hour, and is repeated every one or two days. The temperature rises as in septicemia, but rapidly falls, and at the same time the patient suffers a profuse perspiration. The pulse is weak and rapid; there is anorexia; and there may be delirium, with jaundice and signs of abscesses in the lungs, joints, etc. In pyemia there are repeated rigors and secondary abscesses.

7. In *mitral regurgitation* there is a systolic murmur, heard loudest at the apex, transmitted toward the left axilla, and often heard at the angle of the left scapula. The heart is enlarged.

In *aortic regurgitation* there is a diastolic murmur, heard loudest at the second interspace, transmitted down the sternum. The left ventricle is hypertrophied. There will also be present Corrigan's pulse, and pulsating arteries in the neck.

8. In *erysipelas* the rash is local; it is not punctate; the surface of the skin is smooth and edematous; bullæ are often present, and have a well-defined margin; the skin of the affected part is burning, tender, tense, and painful.

9. *Phlebitis* is apt to begin in a varicose vein; the vein is felt as a hard cord; edema is present, and the skin has a dusky hue.

Lymphangitis generally begins in a sore, the neighboring lymph glands are involved, it tends to spread in a spiral line, and the skin has a rosy tint, which appears before the edema.

10. (1) Very young children are attacked with vari-cella, whereas variola usually shows itself in adults. (2) Vaccinated children readily take varicella; not so variola, even in the modified form. (3) Children who have had varicella may contract variola, even soon afterwards; or the two diseases may co-exist. (4) Varicella is non-inoc- ulable, whereas variola is notoriously so. (5) The erup- tion of varicella appears in twenty-four hours; that of variola not till the third day. (6) The febrile symptoms continue after the eruption appears in varicella; those of variola subside. (7) In varicella the spots come out in successive crops; this is never seen in variola. (8) The spots in varicella are unilocular, and collapse on being punc- tured; the spots in variola are multilocular, and do not collapse on being punctured. (9) In varicella the erup- tion is very irregular, and appears over the body generally; in variola it appears in groups of threes and fives, and is

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always seen on the limbs. (10) The papule in varicella is soft, and disappears on stretching the skin; in variola it is hard and shotty, and does not disappear on stretching the skin. (From J. W. Moore's work on *Variola and Varicella*.)

PRACTICE OF MEDICINE.

2. In *Bell's paralysis* "the muscles of the face being all powerless, the countenance acquires on the paralyzed side a characteristic, vacant look, from the absence of all expression; the angle of the mouth is lower, and the paralyzed half of the mouth looks longer than that on the other side; the eye has an unmeaning stare, owing to the paralysis of the orbicularis palpebrarum. All these peculiarities increase the longer the paralysis lasts, and their appearance is exaggerated when at any time the muscles of the opposite side of the face are made active in any expression, or in any of their ordinary functions. In an attempt to blow or whistle, one side of the mouth and cheeks acts properly, but the other side is motionless, or flaps loosely at the impulse of the expired air; so, in trying to suck, one side only of the mouth acts; in feeding, the lips and cheek are powerless, and, on account of paralysis of the buccinator muscle, food lodges between the cheek and the gums."—(Kirkes' *Physiology*.)

In *Cheyne-Stokes respiration* the respirations gradually increase in volume and rapidity until they reach a climax, when they gradually subside, and finally cease for from ten to forty seconds, when the same cycle begins again.

3. The early manifestations of pulmonary tuberculosis are: (1) *Physical signs*: Deficient chest expansion, the phthisical chest, slight dullness or impaired resonance over one apex, fine moist râles at end of inspiration, expiration prolonged or high pitched, breathing interrupted. (2) *Symptoms*: General weakness, lassitude, dyspnea on exertion, pallor, anorexia, loss of weight, slight fever, and night sweats, hemoptysis.

OBSTETRICS AND GYNECOLOGY.

2. The pelvic diameters are easily remembered from the following table:

	ANTERO-POSTERIOR	OBLIQUE	TRANSVERSE
Brim.....	4 inches.....	4½ inches...	5 inches.
Mid-plane.....	4½ ".....	4½ ".....	4½ "
Outlet.....	5 ".....	4½ ".....	4 "

The fetal head has the following diameters: Occipito-frontal, occipito-mental, bitemporal, biparietal, suboccipito-

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bregmatic, trachelo-bregmatic, and mento-bregmatic. Of these the occipito-frontal is $4\frac{1}{2}$ inches, the occipito-mental is $5\frac{1}{2}$ inches, and all the others are approximately $3\frac{1}{2}$ inches.

MEDICAL JURISPRUDENCE.

1. Any statement made by a dying person who believes that he cannot recover and that he is, at that very time, in actual danger of death. The statement need not be sworn to; it should be voluntary and sincere; and it is admissible as evidence in a court if the individual dies. An official or someone else should take down the deposition in the exact words of the patient, who should, if possible, sign the declaration.

3. *Symptoms* of poisoning by corrosive sublimate are: A burning pain in the mouth, pharynx, and stomach; the mouth and tongue are white; the vomitus is white, with shreds of mucous membrane, and tinged with blood; there may be bloody stools, also salivation.

Treatment: The antidote is white of egg, but too much must not be given at one time; this should be followed by an emetic.

4. "The time at which the bodies of the drowned will float varies with the temperature of the air, the water, the age, sex, and corpulence. As the human body is slightly heavier than water, it must remain submerged until it becomes lighter through the development of gases of putrefaction. Hence, in summer the body may rise within twenty-four hours. In salt water it will float sooner than in fresh; very fat bodies float sooner than lean ones; the bodies of women and those of young children sooner than those of men. Hence, in infanticide by drowning, the infant's body speedily rises to the surface."—(Reese's *Medical Jurisprudence*.)

5. "The postmortem appearances are neither certain nor characteristic. There is usually some fullness of the vessels of the brain; occasionally, extravasation of serum into the ventricles, very rarely of blood. Sometimes there is congestion of the lungs and other vascular organs. The blood is apt to be fluid. The stomach and bowels may be perfectly natural in appearance. The odor of opium may be observed in opening the body. It is hence impossible to diagnosticate a case of opium poisoning from the post-mortem appearance exclusively."—(Reese's *Medical Jurisprudence*.)

6. Malpractice is a failure on the part of a medical practitioner to use such skill, care, and judgment in the treatment of a patient as the law requires; and thereby the patient suffers damage. If due to negligence only, it is

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civil malpractice. But if done deliberately, or wrongfully, or if gross carelessness or neglect have been shown, or if some illegal operation (such as criminal abortion) be performed, it is *criminal malpractice*.

7. The patient should be removed to pure air; inject normal saline solution; the patient should be bled; artificial respiration may be necessary; inhalations of oxygen under pressure have been recommended. The body temperature should be maintained by external heat.

8. The *symptoms* are: Vomiting, purging, collapse; the secretions (including the urine) are suppressed, and the pupils may be dilated.

Treatment: Emetics, lavage, and mucilaginous drinks, with opium to relieve pain.

Lethal dose: Three beans have proved fatal.

9. *Symptoms*: Headache, vertigo, blindness, weakness, and neuritis.

Treatment: Lavage, and strychnine hypodermically.

10. *Symptoms*: Contracted pupils, odor of turpentine on the breath, stertorous breathing, collapse, convulsions, odor of violets to the urine.

Treatment: Lavage, Epsom salts, and mucilaginous drinks, with opium.

STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS, STATE OF OREGON.

PHYSIOLOGY.

1. What is tidal air; complemental air; supplemental air; residual air?
2. State function of carbohydrates.
3. What is meant by tetanus?
4. Describe and give formation of lymph.
5. Define cardiac circle.
6. What is the structure of the stomach? Describe its coats.
7. State variety of secreting membranes and where found.
8. Describe physiology of hearing.

ANATOMY.

1. Describe the elbow joint.
2. Describe the posterior triangle of the neck, giving parts found in it.
3. Describe in detail, ligation of the subclavian artery in the third part of its course.

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4. Name the principal branches of the fifth cranial nerve.
5. What anatomical structures lie beneath Poupart's ligament?
6. What parts would be divided in amputation through the middle of the arm?
7. Describe the common bile duct.
8. Give the blood supply of the eyeball.

HISTOLOGY.

1. Give the histological formation of a long bone as seen in a cross section.
2. Name the principal forms of connective tissue.
3. Trace the course of the urine from the capsule of Bowman to the pelvis of the kidney.
4. Name the corpuscular elements in the blood.

CHEMISTRY.

1. What is an element, and how many are there?
2. Define matter, force, energy, giving an example of each.
3. Define chemical affinity, and how does it differ from other forces?
4. What points are to be considered and substances to be determined in the examination of normal and abnormal urine?
5. Describe the tests for bile, blood, pus, and urea in urine.
6. Give tests for detection of morphine.
7. Give tests for arsenic.
8. Given a suspicious powder, how would you treat it for strychnine?

MATERIA MEDICA AND THERAPEUTICS.

1. Name some of the digestive ferments and when indicated.
2. What chemical changes take place when mineral acids are taken into the stomach?
3. Give the physiological action of phosphorus.
4. Name some of the preparations of arsenic. Give dose of each.
5. Name two stimulant expectorants. Give indications and dose of each.
6. Name some of the antagonists and synergists of mercury.
7. What are the therapeutic indications for digitalis and amyl nitrite?

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8. Name two motor depressants. Under what conditions are they indicated?

DIAGNOSIS.

1. Give diagnosis of Pott's fracture.
2. Give diagnosis of gallstones in the gall-bladder.
3. Give diagnosis of stenosis of the pylorus.
4. Given a case, age 16, two months before had a fracture of the upper third of the femur with union, deformity and two inches shortening. Make diagnosis. What causes the shortening?
5. Give diagnosis of abscess of liver.
6. Differentiate measles and scarlet fever twenty-four hours after the eruption first appears.
7. How could you diagnose green stick fracture of the radius in a child two years old?
8. Give symptoms of stone in the male bladder.

PRACTICE OF MEDICINE.

1. Give causes and symptoms of acute endocarditis.
2. Give symptoms and pathology in acute pleurisy.
3. How would you treat a case of acute lobar pneumonia?
4. Differentiate symptomatically asthma from edema of the glottis.
5. Differentiate a syphilitic from a tubercular ulcer of the pharynx.
6. Give the pathological anatomy in acute parenchymatous nephritis.
7. Diagnose symptomatically cerebral hyperemia from cerebral anemia.
8. Differentiate erysipelas from erythema. Give treatment of former.

EYE AND EAR.

1. What is phlyctenular conjunctivitis? Give treatment.
2. Name some of the ulcers of the cornea.
3. What are the symptoms of acute catarrh of the middle ear?
4. What are the symptoms of otitic meningitis?

NERVOUS DISEASES.

1. What are the phenomena of the reaction of degeneration?
2. What is the etiology and pathology of tabes dorsalis?
3. Give treatment of alcoholic multiple neuritis.
4. Give prominent symptoms of paralysis agitans.

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DISEASES OF WOMEN.

1. Give in detail the operation for post-operative ventral hernia.
2. Give the diagnosis and treatment of intestinal adhesions following laparotomy.
3. Give early diagnostic symptoms of malignancy of the mammary gland.
4. Patient 54 years old, give symptoms of malignancy of the uterus.
5. Give causes and symptoms of vesicovaginal fistula.
6. Have the ovaries any influence upon catalepsy? State your reasons.
7. Following abdominal operation, what causes fecal fistula? What treatment is demanded?
8. Define leucorrhea and give three causes.

OBSTETRICS.

1. What is the conjugate and transverse diameter of the inlet and outlet of the pelvis? Give its anatomical points of measurement.
2. What is the cause of rupture of the uterus, and under what circumstances does it occur?
3. Give your treatment for inevitable abortion.
4. Give your treatment for post-partum hemorrhage.
5. Give cause and treatment for transverse presentations.
6. Give cause, diagnosis, and treatment for puerperal eclampsia.
7. When would you use forceps and how?
8. Give the anatomy of the uterus, and state what changes take place during gestation.

DISEASES OF CHILDREN.

1. Give diagnosis and treatment of spasmodic croup.
2. What are the causes of convulsions in infants and children?
3. What is the prognosis and treatment in diphtheria?
4. Give differential diagnosis of measles, scarlet fever, chicken-pox.
5. Give symptoms of acute bronchopneumonia.
6. Give prophylaxis and treatment of ophthalmia neonatorum.
7. Give a word picture of a case of scabies.
8. Give causes and treatment of summer diarrhea.

SURGERY.

1. Discuss angioma and its varieties.
2. What symptoms would make you suspect malignant

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disease of the sigmoid colon? Indicate treatment.

3. If called to a case of compound fracture of both bones of the leg four hours after the accident, what conditions would decide you for or against amputation?

4. Describe the early symptoms of caries of the dorsal spine, and diagnostic tests for this condition.

5. What are the causes of fistula *in ano*? Discuss the pathology of this condition.

6. Discuss the pathology of congenital torticollis, and its treatment.

7. Describe, step by step, the removal of the left half of a large simple goiter.

8. What are the causes and symptoms of acute suppurative osteomyelitis of the tibia?

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS, STATE OF OREGON.

PHYSIOLOGY.

1. *Tidal air* is the air which is constantly passing in and out of the lungs during ordinary calm respiration. It measures about 30 cubic inches.

Complemental air is the air which can be taken in beyond what is normally inspired in ordinary breathing. It measures about 100 cubic inches.

Supplemental air is the air which can be expelled at an extraordinary expiration. It measures about 100 cubic inches.

Residual air is the air which still remains in the lungs after the deepest expirations. It measures about 100 cubic inches.

2. The *function of the carbohydrates* is to supply animal heat and energy; also to form fats and possibly to help form proteids.

3. *Tetanus* is the condition produced in a muscle when it is stimulated so rapidly that it has no time to relax between one stimulus and the next one; the result is a prolonged, steady contraction.

7. *Secreting membranes* are: (1) *Serous* membranes, as the pleuræ, pericardium, peritoneum, tunica vaginalis of the testis. (2) *Synovial* membranes, in the articulations. (3) *Mucous* membranes, lining the digestive, respiratory, and genitourinary tracts. (4) *Cutaneous* membrane, or skin.

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8. "The waves of sound are gathered together by the pinna and external auditory meatus, and conveyed to the membrana tympani. This membrane, made tense or lax by the action of the tensor tympani and laxator tympani muscles, is enabled to receive sound waves of either high or low pitch. The vibrations are conducted across the middle ear by a chain of bones to the foramen ovale, and by the column of air of the tympanum to the foramen rotundum, which is closed by the second membrana tympani, the pressure of the air in the tympanum being regulated by the Eustachian tube. The internal ear finally receives the vibrations, which excite vibrations successively in the perilymph, the walls of the membranous labyrinth, the endolymph, and, lastly, the terminal filaments of the auditory nerve, by which they are conveyed to the brain."—(Brubaker's *Physiology*.)

ANATOMY.

2. The posterior triangle of the neck is bounded: *Anteriorly*, by the posterior border of the Sternomastoid; *posteriorly*, by the anterior border of the Trapezius, and *below* by the superior border of the clavicle. Its apex is at the occiput. It is subdivided into the occipital and subclavian triangles, by the posterior border of the Omohyoid.

The *floor* is formed by the Splenius capitis, Levator anguli scapulæ, and the Scalenus medius and posticus.

The *roof* is composed of: Skin, Platysma myoides, superficial and deep fascia.

The *contents* are: *Arteries*: Subclavian (third part), suprascapular, transversalis colli, occipital, and superficial cervical. *Veins*: Suprascapular, transversalis colli, external jugular, sometimes the subclavian. *Nerves*: Spinal accessory, branches of cervical plexus, brachial plexus. *Other structures*: Lymphatic glands and Scalenus anticus.

4. The principal branches of the Fifth Cranial Nerve are:

I. *Ophthalmic*, giving off the: Lacrymal, Frontal, and Nasal.

II. *Superior Maxillary*, giving off the: Meningeal, Orbital, Spheno-palatine, Posterior superior dental, Middle superior dental, Anterior superior dental, Infraorbital, Palpebral, Nasal, and Labial.

III. *Inferior Maxillary*, giving off the: Recurrent, Internal pterygoid, Masseteric, Deep temporal, Buccal, External pterygoid, Auriculo-temporal, Inferior dental, and Lingual.

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5. The anatomical structures which lie beneath Poupart's ligament are (from without inward): External cutaneous nerve, Iliacus, anterior crural nerve, Psoas, femoral artery, femoral vein, femoral ring.

6. In amputation through the middle of the arm the following parts are divided: Skin; fascia; Biceps, Triceps, and Brachialis anticus muscles; brachial, superior profunda, and inferior profunda arteries; brachial, basilic, and cephalic veins; median, ulnar, internal cutaneous, musculo-spiral, and musculo-cutaneous nerves; and humerus.

8. The *blood supply of the eyeball*: The short posterior ciliary, long posterior ciliary, and anterior ciliary arteries, and the arteria centralis retinae.

HISTOLOGY.

2. The principal forms of connective tissue are: White fibrous, yellow elastic, areolar, mucous, retiform, adipose, adenoid, neuroglia, cartilage, bone, dentine, and blood.

3. Course of the urine from the capsule of Bowman to the pelvis of the kidney: The neck of the capsule, proximal convoluted tubule, spiral tubule, descending limb of Henle's loop, Henle's loop, ascending limb of Henle's loop, zigzag tubule, distal convoluted tubule, junctional tubule, collecting tubule, duct of Bellini.

4. The corpuscular elements in the blood are: Red or colored corpuscles, white or colorless corpuscles, and platelets.

CHEMISTRY.

1. An *element* is a substance which cannot by any known means be split up into two or more other kinds of substance. There are, at present, eighty elements.

2. *Matter* is anything which occupies space. Example, a cannon ball.

Force is that which produces or tends to produce motion or change of motion in matter. Example, gravitation.

Energy is the capacity of matter for doing work. Example, falling water may turn a wheel.

3. *Chemical affinity* is the force that binds atoms together to form molecules.

It differs from other forces in: (1) Only acting between atoms, and not on molecules or masses; (2) being able to effect changes in chemical composition; (3) it will not act at a distance, but the atoms must be in intimate contact; (4) it will not act if other substances are interposed; (5) it is usually necessary to start or to support it by heat, or electricity, or other agency.

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4. In examining *normal* urine the following points are to be considered:

The quantity voided in twenty-four hours, its general appearance, color, odor, reaction, specific gravity, quantity of solids excreted, quantity of urea, uric acid, chlorides, sulphates, phosphates.

In *abnormal* urine, in addition to the above, examination should be made for albumin, sugar, excess of indican, acetone, blood, bile, pus, casts, epithelium, parasites, pathogenic bacteria, and foreign bodies.

5. Test for *Bile*: Put 3 c.c. HNO_3 in a test tube, add a piece of wood, and heat until the acid is yellow; cool. When cold, float some of the urine to be tested upon the surface of the acid. A green band is formed at the junction of the liquids, which gradually rises, and is succeeded from below by blue, reddish-violet, and yellow.

Test for *Blood*: To the urine add a solution of potassium hydroxide to distinct alkaline reaction; heat nearly to boiling (do not boil). A red precipitate is produced.

Chemical test for *Pus* in the urine: Acidify the urine with acetic acid, then filter it, and treat the filter with a few drops of freshly prepared tincture of guaiacum; a deep blue color denotes the presence of pus.

A comparatively easy test for *Urea* is that of Fowler, based upon the loss of the specific gravity of the urine after the decomposition of the urea by hypochlorite. "To apply this method the specific gravity of the urine is carefully determined, as well as that of the liquor sodæ chlorinatæ (Squibb's). One volume of the urine is then mixed with exactly seven volumes of the liquor sodæ chlorinatæ, and, after the first violence of the reaction has subsided, the mixture is shaken from time to time during an hour, when the decomposition is complete; the specific gravity of the mixture is then determined. As the reaction begins instantaneously when the urine and reagent are mixed, the specific gravity of the mixture must be calculated by adding together once the specific gravity of the urine and seven times the specific gravity of the liquor sodæ chlorinatæ, and dividing the sum by eight. From the quotient so obtained the specific gravity of the mixture after decomposition is subtracted; every degree of loss in specific gravity indicates 0.7791 gram of urea in 100 c.c. of urine. The specific gravity determinations must all be made at the same temperature; and that of the mixture only when the evolution of gas has ceased entirely." (Witthaus' *Manual of Chemistry*.)

6. Tests for the detection of *Morphine*: (1) Add a solution of neutral ferric chlorid; a blue color is given

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in the presence of morphine. (2) Add some Fröhde's reagent (a fresh solution of ammonium molybdate in concentrated sulphuric acid); in the presence of morphine a violet color is produced, which changes to blue, dirty green, and pale pink.

7. Tests for *Arsenic*: Marsh's and Reinsch's are the two most commonly used tests. Reinsch's test is as follows: To the suspected fluid add a little pure HCl; suspend in the fluid a small strip of bright copper foil, and boil. If a deposit forms on the copper, remove the copper, wash it with pure water, dry on filter paper, but be careful not to rub off the deposit. Coil up the copper, and put it into a clean dry, glass tube, open at both ends, and apply heat at the part where the copper is. If arsenic is present there will appear in the cold part of the tube a mirror, which will be found on microscopical examination to consist of octahedral crystals of arsenic trioxide.

8. To test for *Strychnine*: Add concentrated sulphuric acid; it forms a colorless solution; a crystal of potassium bichromate, if drawn through this solution, produces a track of color, which is in turn blue, violet, rose-colored, and yellow.

MATERIA MEDICA AND THERAPEUTICS.

1. There are only two official digestive ferments, viz., pepsin and pancreatin. Inglutin and papayin are also digestive ferments.

Pepsin is indicated as an aid to gastric digestion in gastralgia, gastric cancer and ulcer, atonic dyspepsia, and the vomiting of pregnancy.

Pancreatin is indicated as an aid to digestion, and for the predigestion of food, in convalescence, in wasting diseases, and in intestinal dyspepsia.

2. When mineral acids are taken into the stomach, they unite with bases and form neutral salts.

3. Phosphorus acts locally as an irritant; internally it is a stimulant to the nervous system and also to the bone-forming cells, a tonic, a repairer of waste, a circulatory stimulant and an aid to the formation of red blood corpuscles. It is partly oxidized into phosphorus acid or phosphoric acid, of the oxygen in the red corpuscles. In large doses it increases the urea and other nitrogenous products, raises the body temperature, diminishes the glycogen of the liver, and may cause fatty degeneration.

4. The official preparations of arsenic, with their doses, are: Arseni trioxidum, gr. 1/30; Liquor acidi arsenosi, ℥vij; Arseni iodidum, gr. 1/20; Sodii arsenas, gr. 1/6; Sodii arsenas exsiccatus, gr. 1/20; Liquor potassii arsenitis, ℥vij; Liquor sodii arsenatis, ℥v; Liquor arseni et hydrargyri iodidi, ℥vij.

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5. Two stimulating expectorants: The ammonium salts and senega.

The chloride of ammonium is thus used in doses of gr. x-xx, in bronchorrhea and chronic bronchitis, and the carbonate of ammonium in doses of gr. v is used in the crisis of pneumonia.

Senega is used as an expectorant in chronic bronchitis, and in acute bronchitis; the dose of the syrup of senega is $\mathfrak{z}\text{i}$; of the fluid extract $\mathfrak{m}\mathfrak{x}\mathfrak{v}$.

7. *Therapeutic indication for digitalis*: Mitral lesions of the heart, cardiac palpitation, irritable heart from nerve exhaustion, cardiac and renal dropsy, exophthalmic goiter.

Therapeutic indications for amyl nitrite: Angina pectoris, epilepsy, whooping cough, asthma, laryngismus stridulus, and high arterial tension in arteriosclerosis, nephritis.

8. Two motor depressants: Chloral and stramonium.

Chloral is indicated: As a hypnotic in insomnia, in whooping cough, tetanus, strychnine poisoning, hernia, convulsions.

Stramonium is indicated: In asthma, whooping cough, chorea, dysmenorrhea, neuralgia, mania.

DIAGNOSIS.

1. In Pott's fracture the foot is twisted outward, the sole everted, and the heel drawn up; there is a depression at the site of the fracture, the inner malleolus either projects prominently or the fragment can be felt and crepitus elicited; the foot is shortened, and the ankle is swollen and widened.

2. Gallstones in the gall-bladder may give no symptoms at all; or there may be dull pain localized over the region of the gall-bladder, digestive disturbances, muscular rigidity, and leucocytosis; or there may be very severe pain in the region of the gall-bladder, radiating to the right shoulder and the epigastrium, with vomiting, collapse, severe sweating, and sometimes jaundice.

3. Stenosis of the pylorus is diagnosed by the peculiar recurrent vomiting of large quantities of food, some of which has been in the stomach for several days; the vomitus contains the *Sarcina ventriculi* and several bacteria; the stomach is prolapsed considerably; a splashing sound may be elicited on palpation, and sometimes a tumor may be felt in the region of the pylorus.

4. The shortening is caused by the action of the following muscles: The Glutei, Biceps, Semimembranosus, Semitendinosus, Tensor vaginae femoris, Rectus, Sartorius, Adductors, Gracilis, and Iliopsoas.

5. Abscess of the liver is diagnosed by: The enlarge-

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ment of the liver, jaundice, tenderness, pain which may radiate to the right shoulder; emaciation, chills, fever, and sweats may also be present; aspiration will confirm the diagnosis by revealing pus; there may also be leucocytosis and anemia.

6. In *scarlet fever* the eruption is brighter, is on a red background, punctiform, and is more uniform; the temperature is higher, the pulse quicker; the tongue is of the "strawberry" type, the lymphatics in the neck may be swollen, and there is sore throat.

In *measles* the eruption is darker, less uniform, more shotty; the temperature is lower, pulse slower, the tongue is not of the "strawberry" type; coryza, coughing, and sneezing may be present.

7. In green-stick fracture of the radius in a child two years old a bowing or angle in the bone may be detected on palpation, there will usually be a history of a fall on the outstretched hand or on the forearm, pain and tenderness with "favoring" of the part will be apparent, and an x-ray examination may clear up the diagnosis.

8. The *symptoms of stone in the male bladder* are: Increased frequency of micturition; pain at end of urination, chiefly felt at the end of the penis or in the neck of the bladder; the urine may contain pus, mucus or blood; a "click" can be obtained by using a searcher or sound; examination by the cystoscope may reveal the presence of the stone.

PRACTICE OF MEDICINE.

4. In *asthma* the dyspnea is expiratory only: In *edema of the glottis* it is inspiratory, and occasionally expiratory also.

5. Syphilitic ulcers of the pharynx and tubercular ulcers of the pharynx are differentiated by Bosworth as follows:

SYPHILITIC ULCERS.	TUBERCULOUS ULCERS.
Deeply excavated.	No apparent excavation.
Few granulations, and those highly inflammatory.	Much indolent granulation.
Deep-red areola.	Faint areola.
Sharply-cut edges.	Irregular and ill-defined edges.
Distinct demarcation.	Demarcation indistinct.
Yellow purulent secretion.	Grayish, ropy mucous secretion.
Discharge profuse.	Discharge scanty.
Penetrating to deeper tissues.	Superficial, with lateral in place of deep extension.
No fever as a rule.	Hectic fever as a rule.

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7. *Cerebral hyperemia* is characterized by: Fullness in the head, vertigo, restlessness, insomnia or disturbed sleep, ringing in the ears, and forgetfulness; on lying down the symptoms become worse; hyperemia of the retina may be detected by the ophthalmoscope.

Cerebral anemia is characterized by: Pallor, nausea, vertigo, yawning, dilated pupil, headache, forgetfulness, tinnitus aurium, and forgetfulness; on lying down the symptoms improve; pallor of the retina may be detected by the ophthalmoscope.

8. *Erysipelas* is characterized by: A rise of temperature; a tendency to spread; the skin is swollen and the affected part has a well-defined border and raised margins; there are pain, considerable constitutional disturbance, and a possibility of infection.

In *erythema*: There is no rise of temperature, no tendency to spread, no raised margins, no constitutional disturbance; the margin of the rash gradually fades into skin of a normal healthy color.

EYE AND EAR.

2. *Some of the ulcers of the cornea*: Catarrhal, creeping, deep, infected, rodent, simple, superficial, dendritic, indolent.

NERVOUS DISEASES.

1. *The phenomena of the reaction of degeneration*: "In health a sharp contraction occurs if a faradic current is applied to a nerve or over a muscle, and a similar contraction can be obtained with the galvanic current just when the circuit is closed or broken, but not when the current is passing.

"In contrast with these conditions is the *reaction of degeneration*. When this is present we obtain no muscular twitching with the faradic current and none over the nerve with the galvanic; but *with the galvanic over the muscle a slow, worm-like contraction* occurs, and the response to the positive pole is as good as to the negative, or better; whereas, normally there is far better response to the negative. This is the *complete* reaction of degeneration; in *partial* reactions of degeneration all the normal reactions may be present, but diminished in intensity." (Cabot's *Physical Diagnosis*.)

2. *TABES DORSALIS*: *Etiology*: Tabes dorsalis is a disease of adult life; is more common in men than in women; is more common in cities than in the country; syphilis is believed to be the most frequent direct cause; alcoholism, injury, exposure to cold and wet, have all been urged as

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causes, but they are not now assigned so important a place as etiological factors as was formerly the case.

Pathology: Tabes dorsalis is a condition in which the posterior columns and nerve roots of the spinal cord are degenerated, and which is characterized by incoordination, loss of deep reflexes, and various disturbances of sensation and nutrition.

The posterior columns of the cord are gray and shrunken and show considerable overgrowth of connective tissue in the columns of Goll, Burdach, and Lissauer; this process extends upward from the lumbosacral region; the posterior nerve roots degenerate and become atrophic. The meninges over the affected parts become opaque and adherent. Some of the cranial nerves may also atrophy, notably the optic, but also the motor oculi and vagus.

4. *The prominent symptoms of paralysis agitans are:* A fine tremor, usually beginning in the hand; muscular rigidity, with the head bowed, the body inclined forward, and the knees bent; the "festinating gait," in which the patient walks faster and faster and even runs, to avoid falling forward; the face is expressionless.

DISEASES OF WOMEN.

3. *The early diagnostic symptoms of malignancy of the mammary gland are:* An ill-defined thickening of one of the lobes of the breast, or a nodular swelling; generally painless, or accompanied by an occasional darting pain; it is an indolent swelling, with no signs of inflammation, and perhaps an induration of the part; an exploratory puncture or incision will settle the diagnosis between malignancy and a cyst.

4. In a patient 54 years old the symptoms of malignancy of the uterus would be: Hemorrhage, an offensive discharge, and pain; later on, cachexia.

5. *Vesicovaginal fistula may be caused by:* Injuries, and traumatism received during labor; ulceration due to a retained or ill-fitting pessary, or a vesical calculus; a malignant growth of the bladder or vagina.

Symptoms: The urine constantly dribbles from the vagina; micturition is painful; excoriation of vagina, vulva, and thighs; cystitis may be present, and the patient's general health deteriorates.

7. *Fecal fistula following abdominal operation may be caused by:* Injury to the intestine while separating adhesions; leakage of the intestine after an anastomosis or suturing; necrosis of the intestine from pressure or from an inflammatory mass.

The treatment demanded is: Cleanliness; protection

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from irritation, and, failing ultimate healing, operative treatment is required.

8. *Leucorrhea* is a whitish discharge from the uterus or vagina.

Three causes: Pelvic congestion, endometritis, retroversion of the uterus.

OBSTETRICS.

1. The *conjugate diameter* of the *inlet* of the pelvis is a line drawn from the middle of the sacral promontory to the top of the symphysis pubis. It is about four inches in length.

The *transverse diameter* of the *inlet* of the pelvis is a line drawn right across the pelvis from one lateral margin of the brim to the other. It is about five inches in length.

The *conjugate diameter* of the *outlet* of the pelvis is a line drawn from the tip of the coccyx to the lower surface of the symphysis pubis. It is about five inches in length.

The *transverse diameter* of the *outlet* of the pelvis is a line extending across the pelvis from one tuberosity of the ischium to the other. It is about four inches in length.

2. The cause of *rupture of the uterus* is: Strong uterine contraction in combination with some obstacle to the birth of the fetus. It is apt to occur in cases of contracted or deformed pelvis, transverse presentation, obstruction from tumors, unduly large fetal head.

3. In *inevitable abortion* there are two lines of treatment:

(1) The *expectant*, which consists in absolute rest, the insertion of tampons in the vagina, vaginal douches, and the administration of ergot.

(2) *Active treatment*, which consists in anesthetizing the patient, dilating the os, and removal of the products of conception generally by curettage. This is followed by intrauterine douche and sometimes by the application of Churchill's tincture of iodine to the uterine cavity, and insertion of gauze.

7. *Indications for the use of forceps* are: "1. *Forces at fault:* Inertia uteri in the presence of conditions likely to jeopardize the interests of mother or child. (a) Impending exhaustion; (b) arrest of head, from feeble pains. 2. *Passages at fault:* Moderate narrowing, $3\frac{1}{4}$ to $3\frac{3}{4}$ inches, true conjugate; moderate obstruction in the soft parts. 3. *Passenger at fault:* A. Dystocia due to (a) occipito-posterior, (b) mento-anterior face, (c) breech arrested in cavity. B. Evidence of fetal exhaustion (pulse above 160 or below 100 per minute). 4. *Accidental complications:* Hemorrhage; prolapsus funis; eclampsia. All

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acute or chronic diseases or complications in which immediate delivery is required in the interest of mother or child, or both." (From Jewett's *Practice of Obstetrics*.)

DISEASES OF CHILDREN.

2. *Causes of convulsions in infants and children* are: "Overeating, especially of indigestible food; rachitis, debility from exhausting diarrheal diseases; high fever, especially at the onset of the acute specific infections; very seldom dentition, phimosis, and acute middle-ear inflammation; injuries to the brain at birth, infantile hemiplegia, meningitis, and tumor of the brain; rarely of spinal cord disease." (From Butler's *Diagnostics of Internal Medicine*.)

6. *Prophylaxis of ophthalmia neonatorum*: Whenever there is the possibility of infection, or in every case, wash the eyelids of the newborn child with clean warm water, and drop on the cornea of each eye one drop of a one or two per cent. solution of nitrate of silver, immediately after birth.

Treatment: Wash the eyes carefully every half hour with a saturated solution of boric acid; pus must not be allowed to accumulate. Two drops of a two per cent. solution of nitrate of silver must also be dropped on to the cornea every night and morning. The eyes must be covered with a light, cold, wet compress. The patient must be isolated, and all cloths and compresses used must be burnt.

7. *Scabies* is a contagious, animal, parasitic disease due to the *Sarcoptes scabiei*, characterized by burrows and a multiform eruption, and attended by severe itching. The eruption usually occupies certain areas where the skin is thin; these are the interdigital spaces, the flexor surface of the wrist and arm, the anterior and posterior axillary folds, the mammæ and nipples (in women), the umbilicus, the buttocks, the penis, the inner side of the thighs and legs, and the toes. The face is exempt except occasionally in infants. The itching is intense and worse at night. The affection is curable, but dermatitis may result from over-treatment.

SURGERY.

3. If the blood-vessels are injured to such an extent that it is evident that the foot must become gangrenous, or if the large arteries are divided, amputation should be performed. So, too, when there is much destruction of bone, and when there is much suppuration and indications of septicæmia. If it is probable that recovery will be long

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and tedious and in the end the patient will only have a limb of doubtful value, the patient should be asked to decide the question of amputation.

4. The *early symptoms of caries of the dorsal spine* are: (1) The child easily tires, even in his play, and often wants to lie down and rest; (2) local tenderness, which is found by pressing over the spinous processes one at a time, and also by pressing lightly on the head; (3) all movements are made very carefully, from fear of causing pain; (4) in picking up anything from the floor, the child will keep the spine rigid and bend the knees; (5) the shoulders are apt to be elevated and the spine kept rigid.

5. The *causes of fistula in ano* are: Some suppurative condition in the neighborhood of the rectum, such as an anal abscess or ischiorectal abscess; stricture of the rectum; perforation of the mucous membrane of the rectum by some foreign body, such as a fish-bone, and ulceration of the mucous membrane of the rectum.

Pathology: There are four varieties: (1) The *complete*, which opens into the rectum internally and on the perineum externally; (2) the *external incomplete*, or *blind external*, which opens on the perineum but not into the rectum; (3) the *internal incomplete* or *blind internal*, which opens into the rectum but not on the perineum; (4) the *horseshoe* fistula, which extends around the rectum and opens on each side. The internal opening is generally between the two sphincters, but may be above the internal sphincter and below the external sphincter. There may be several pockets or side tracts extending in different directions.

6. *Pathology of congenital torticollis:* "In the ordinary type of congenital torticollis, as demonstrated at operations on children, the substance of the affected muscle or muscles is simply lessened in amount, and there is a disproportionate area of tendinous substance, as contrasted with the contractile tissue. In other instances the muscle may be traversed by fibrous bands or patches of scar-like tissue. Such changes are far more common in acquired torticollis, and they indicate primary or secondary inflammation of the muscular substance. In cases of torticollis in infancy, or when the distortion is slight, there is but little general effect of the local contraction; but, if the deformity persists, secondary changes appear. The face on the affected side is flatter, the nose, the corner of the mouth, and the eyelids may be drawn down toward the contraction, and the skull even may be markedly deformed. There is in all cases of this character lateral distortion of the cervical spine, the convexity being on the

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side opposite the contraction. Later, secondary curvature of the spine develops. Usually there are also an increase of the dorsal convexity, "round shoulders," and a lateral compensatory curve in the direction opposed to the superior deformity. If the deformity persists the neighboring muscles become eventually involved, together with the other tissues on the contracted side, the fascia presenting the greatest resistance to the correction." (*Reference Handbook of the Medical Sciences.*)

STATE BOARD EXAMINATION QUESTIONS.

MEDICAL BOARD OF EXAMINERS OF THE STATE OF PENNSYLVANIA.

ANATOMY.

1. Name the arteries through which blood would pass from the heart to the thumb and the veins through which it would return from the thumb to the heart.
2. Describe the formation of the palmar arterial arches, and give anatomical landmarks for location of the same.
3. Describe the bony relationships and landmarks of the elbow joint.
4. Describe the anatomical structure of the female perineum.
5. Describe the structure and anatomical relationships of the female mammary gland.
6. Describe the anatomical structures entering into the formation of (a) the internal and (b) the external abdominal rings.
7. What muscles are attached to the great trochanter of the femur?
8. Describe the appendix vermiformis; give its relations and the external landmarks of its location.
9. Describe the superior maxillary bone.
10. Describe the uterus and give its relations and nerve supply.

PHYSIOLOGY.

1. Define metabolism. Cite an example.
2. Enumerate four conditions to be observed in taking the pulse, and describe what each signifies.
3. Over what functions of the body does the cerebellum preside?
4. Describe the thermal and chemical changes in muscle, as the result of exercise.
5. How is respiration influenced by the nervous system?

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CHEMISTRY.

1. What is hemoglobin; name some of its properties and give a chemical test for it.
2. What chemical reaction takes place when hydrogen dioxid is applied to sloughing wounds?
3. Describe a reliable test for the detection of free hydrochloric acid in gastric contents.
4. When testing for albumin in urine, how do you determine between it and other coagulable proteids?
5. When testing for glycosuria with Fehling's solution, how do you determine whether the reaction is that of sugar or some other reducing agent?

MATERIA MEDICA.

1. Classify electricity as a remedial agent, (b) and name the different forms useful in the treatment of morbid conditions, (c) describe how they are applied.
2. Name five vegetable and three mineral astringents, describing method of administration and dose in each instance.
3. Name and describe three antiseptics useful in internal medication.
4. Describe and classify the important active principle of each of the following drugs: *Hydrastis canadensis*, *veratrum viride*, and *humulus*.
5. Write a complete prescription for a child of three years suffering with pertussis. (or) Discuss ergota, stating to what alkaloid or active principle it owes its therapeutic activity.

PATHOLOGY.

1. Describe the cardiac changes that occur in mitral stenosis.
2. Describe the alterations that occur in the respective coats of an artery which is the seat of endarteritis obliterans.
3. Describe two methods of wound repair.
4. Describe the pathological changes occurring in dry gangrene.
5. Describe the various forms of acute salpingitis.

DIAGNOSIS.

1. Give a practical method of differentiating gastropnoia and gastrectasis.
2. Differentiate chronic parenchymatous nephritis and chronic interstitial nephritis.
3. Describe a case of tabes dorsalis and differentiate the condition from multiple sclerosis.
4. State the diagnostic symptoms of progressive per-

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nicious anemia, and what changes in the blood aid in the diagnosis.

5. Differentiate acute synovitis and acute articular rheumatism.

THERAPEUTICS AND PRACTICE OF MEDICINE.

1. What are the symptoms of exophthalmic goiter, and what are some of the measures employed in its treatment?

2. What are the symptoms of abscess of the lung?

3. Describe the treatment of a case of sunstroke.

4. What are the symptoms of a typical case of acute lobar pneumonia?

5. Describe the treatment of a case of diphtheria.

6. Describe the symptoms and treatment of a case of acute tonsillitis.

7. Describe the symptoms of a case of chronic lead poisoning and outline a method of treatment.

8. What are the symptoms of poisoning by belladonna, and how would you treat such a case?

9. Name some of the indications and contraindications of ergot.

10. Name some of the most important uses of the preparations of *erg* am.

OBSTETRICS.

1. Give the maternal causes of dystocia, and methods of treatment.

2. Give the most frequent causes of puerperal mammary inflammation and give treatment.

3. How would you deliver a child when face is presenting with chin posterior?

4. Describe the various methods of preventing infection during childbirth.

5. Give symptoms and treatment of placenta prævia.

6. Give the indications for version, and detail the operation.

7. Give the methods of resuscitation in the apparently still-born.

8. What symptoms would lead you to suspect threatened miscarriage?

9. Name the cause and give the diagnosis of pelvic hematocele.

10. To prevent laceration of the perineum, describe the proper method of delivering the head.

SURGERY.

1. Give the diagnosis and treatment of transverse fracture of the patella.

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2. Describe the symptoms and give the treatment of the several forms of gangrene.
3. Define surgical shock and give treatment.
4. What are the symptoms of "Colles' fracture," and give treatment.
5. Describe a backward dislocation of the hip joint, and give treatment.
6. Describe the objective and subjective symptoms of strangulated inguinal hernia, and an operation for the relief of the same.
7. Give the symptoms and treatment of fracture of the vertebral column with compression of the spinal cord.
8. Enumerate the recognized degrees of burns, and describe the treatment for the second degree.
9. Describe surgical methods for treatment of stricture of the male urethra, with respective indications.
10. Give a minute description for the proper administration of ether for general anesthesia.

HYGIENE.

1. Name three diseases due to animal parasites, and tell how their introduction into the human system may be prevented.
2. What are the relative effects on health of altitude, sea air, humidity and sunshine.
3. What diseases are communicated by stools and sputum, and what are the best methods of prevention of communication?
4. Name three exanthematous fevers and describe a rational effective method of quarantine, giving the proper duration thereof.
5. Give the disadvantages and dangers of cold storage foods.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

MEDICAL BOARD OF EXAMINERS OF THE STATE OF PENNSYLVANIA.

ANATOMY.

1. The *arteries* through which blood would pass from the heart to the thumb, are:—Aorta, innominate (on right side only) subclavian, axillary, brachial, radial, and princeps pollicis or dorsalis pollicis. The *veins* through which it would return to the heart are arranged in two sets:—(1) *Superficial veins*:—venous plexuses, superficial

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radial, cephalic, axillary, subclavian, innominate and superior vena cava. And (2) *Deep veins*:—The venæ comites of the radial or deep radial, brachial, axillary, subclavian, innominate, and superior vena cava.

3. If the forearm is extended, the internal condyle of the humerus, the tip of the olecranon, and the external condyle will all be found on the same transverse line. In extreme extension the tip of the olecranon is slightly above the level of the condyles. If the forearm is flexed to a right angle, the tip of the olecranon is immediately below the condyles.

PHYSIOLOGY.

1. Metabolism is a name given to the entire series of changes that occur in a cell or organism during the processes of nutrition. It is of two kinds:—(1) anabolic, or constructive, and (2) catabolic, or destructive. The changes produced in the cells by the oxygen or nutrition conveyed by the blood, come under the class of anabolic changes.

2. (1) Its *frequency*: this gives the rate of the heart beats. (2) its *compressibility*: this denotes the force with which the heart is beating. (3) Its *tension*: this denotes the peripheral resistance, and also the state of the arterial walls. (4) Its *regularity* or *rhythm*: this denotes the regularity (or otherwise) of the heart's action in force or rhythm.

3. Muscular coördination, and equilibrium.

4. There is an increase in heat production, and consequently a rise of temperature. The muscle becomes acid in reaction, due to the development of sarcolactic acid; at the same time there is an increased consumption of oxygen, and more carbon dioxide is set free.

CHEMISTRY.

1. Hemoglobin is the coloring matter of the blood. It exists in the blood in two forms, as hemoglobin and as oxyhemoglobin. Chemically it is a protein; its molecule is very complex, and consists of the elements carbon, hydrogen, oxygen, nitrogen, iron, and sulphur. It is a crystalline solid, and is not diffusible. Hemoglobin is the means by which the oxygen is carried by the blood to the tissues. It readily enters into combination with other gases such as carbon monoxide, nitrogen dioxide, and hydrocyanic acid. It is soluble in water, insoluble in alcohol and ether.

Test. Mix some of the suspected liquid with a few drops of a saturated solution of sodium chloride, evaporate to dryness on a microscopic slide, add a drop or two of glacial

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acetic acid and gently warm; crystals or hemin or hematin will form on cooling, and may be seen under the microscope.

2. Oxygen is liberated and effervescence occurs. It acts as an antiseptic.

3. The phloroglucin-vanillin test:—The reagent is made by dissolving two grams of phloroglucin and one gram of vanillin in 100 cc. of alcohol. The test is made by taking a few drops of the filtered gastric contents and an equal quantity of the freshly-prepared reagent; these are then mixed in a porcelain dish, and evaporated over a water bath; in the presence of free hydrochloric acid a brilliant red color is produced, beginning at the upper border.

4. By using the four tests, as mentioned in the following table (compiled from Croftan):

	The Boiling Test	The Nitric Acid Test	The Potassium Ferrocyanide Test	The Biuret Reaction
Serum Albumin...	Positive..	Positive.....	Positive.....	Positive
Serum Globulin...	Positive..	Positive.....	Positive. On the addition of acetic acid there is a precipitate which is re-dissolved on the addition of more acid.	Positive
Nucleo-albumin...	Negative..	Positive.....	Positive..... On the addition of acetic acid there is precipitate which does not re-dissolve on the addition of more acid.	Positive
Albumoses.....	Negative..	Positive. The precipitates formed in the cold disappear on heating, but re-appear on cooling.	Positive. The precipitates formed in the cold disappear on heating, but re-appear on cooling.	Positive
Peptones.....	Negative..	Negative.....	Negative.....	Positive

5. On getting a positive result with Fehling's solution, a further examination should be made by the fermentation test. If fermentation occurs, it indicates the presence of sugar. The phenylhydrazine test may also be applied; it does not react with reducing agents other than sugar.

MATERIA MEDICA.

1. Bartholow classifies electricity among the agents used

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to excite the functional activity of the spinal cord and the sympathetic.

(b) Static or frictional, magnetism, galvanism, faradism.

2. *Five vegetable astringents*:—Hammamelis, dose of the fluid extract, ℥xxx. Gambir, dose, gr. xv. Kino, dose, gr. vijss. Hematoxylon, dose of the extract, gr. xv. Tannic acid, dose, gr. vijss.

Three mineral astringents:—Alum, dose, gr. vijss. Copper sulphate, dose, gr. 1/5. Silver nitrate, dose, gr. 1/5. Of the above silver nitrate is only applied locally as an astringent; all the others can be used internally or locally.

3. Phenol, creosote, and phenyl salicylate (salol).

4. *Hydrastis canadensis*: berberine and hydrastine, both alkaloids. *Veratrum viride*: jervine and veratrine, both alkaloids. *Humulus*: lupuline, an alkaloid.

5. ℞ Tincturæ belladonnæ 3j
Extracti cannabis indicæ gr. jss
Glycerini 3j
Tincturæ aurantii amari 3ijss
Aquæ destillatæ q. s. ad ʒiv. Misce.

Signa:—Two teaspoonfuls every four hours.

The composition of ergot is indefinite; the chief constituents are:—Ergotine, ergotinine, ecboiline, sphacelic acid, ergotinic acid, cornutine, tannic acid, and other substances. Most of these ingredients contract the blood vessels; the cornutine, in addition, is credited with the chief part in contracting the uterus.

DIAGNOSIS.

1. The stomach should be inflated; the diagnosis is then made by outlining the stomach. In both conditions the lower border of the stomach is depressed below the umbilicus. But in *Gastroptosis*, the upper border and pyloric end are also depressed, and the stomach assumes a vertical position; whereas in *Gastrectasis*, the upper border and pyloric end are but slightly depressed.

2. The following table is from Millard's work on *Bright's Disease*:

CHRONIC PARENCHYMATOUS NEPHRITIS.	CHRONIC INTERSTITIAL NEPHRITIS.
The urine is always albuminous.	Urine not constantly albuminous.
Urine usually scanty.	Urine usually abundant.
Dropsy and edema almost always occur.	Dropsy seldom or never present; sometimes slight edema.

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CHRONIC PARENCHYMATOUS NEPHRITIS.

Hypertrophy of the heart seldom exists.

Specific gravity of urine usually higher than the normal. Urine darker and with less of a soapy appearance.

Uremic symptoms less frequent.

Epistaxis and cerebral hemorrhages rare.

Occurs most frequently before the age of forty.

Blood corpuscles and connective tissue shreds more frequently found.

Casts more numerous and in greater variety; waxy, granular, fatty, and hyaline casts occurring.

Epithelia from the kidney and pus corpuscles more numerous.

Urates and phosphates predominate; oxalates rare.

Albuminous retinitis rare.

Gangrenous erysipelas and phlegmonous swellings more common; also dyspepsia and anemia.

Visceral complications not uncommon.

Atheroma of arteries rare.

CHRONIC INTERSTITIAL NE- PHRITIS.

Some hypertrophy of heart, with increased arterial tension, almost always present.

Urine generally of a light color and low specific gravity.

Uremic symptoms are met with in their most pronounced form, and in severe cases usually occur.

Epistaxis and cerebral hemorrhages frequent.

Occurs most frequently after forty.

Absent.

Development more gradual, the health of patient often less impaired, and duration longer.

Casts rare, the hyaline variety being most frequently met with.

Kidney epithelia and pus corpuscles scanty, and occasionally absent.

Oxalate of lime almost always occurs.

Albuminous retinitis common.

Visceral complications rare.

Atheroma common.

3. In *multiple sclerosis* there will be found increased reflexes, a greater loss of muscular power, volitional tremor, nystagmus.

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In *locomotor ataxia*, there are: lightning pains, loss of knee jerk, ataxia, but not much loss of muscular power, Argyll-Robertson pupil.

4. Pallor, indisposition to exertion, palpitation of heart, flabbiness of muscles, poor appetite, languor, edema, debility, hemic murmurs, water-hammer pulse, dyspepsia, diarrhea. The blood changes are:—great diminution in the number of red corpuscles, hemoglobin is relatively increased, the red cells vary considerably in size and shape, and there are present nucleated red corpuscles of all sizes and in varying numbers. The white corpuscles are either unchanged or slightly diminished in number.

THERAPEUTICS AND PRACTICE OF MEDICINE.

1. Tachycardia, enlargement of the thyroid gland, exophthalmos, and tremor are the cardinal symptoms. Other symptoms are:—pigmentation of the skin, edema and moisture of the skin, impaired nutrition, anemia, and mental irritability and depression.

Among the measures employed in its treatment are:—iron, digitalis, ergot, the bromides, rest in bed with application of ice bag over the heart or thyroid gland, electricity, thyroid or thymus extract, iodine, opium, section of the cervical sympathetic nerve, and partial thyroidectomy.

2. Chills, high fever, signs of a cavity or of general pyemia; the sputum is offensive and yellowish or greenish in color, and contains elastic fibers or fragments of lung tissue.

3. The first thing is to lower the body temperature. The patient should be put into a cold bath, rubbed with ice, and given a hypodermic of some active antipyretic; he should be wrapped in a wet sheet, and if necessary may receive ice water enemata. Further symptoms may be treated as they arise; for heart failure, digitalis and strychnine may be given hypodermatically; for convulsions, chloral or chloroform.

7. *Symptoms*:—colic, chiefly round the umbilicus; cramps in the flexor muscles, muscular paralysis (wrist drop); pain in some of the joints; blue line on the gums at the border of contact with the teeth; anemia; constipation; eclampsia and nervous symptoms may also be present.

Treatment:—The patient should be removed from the source of harm, personal cleanliness in every way must be enforced, a hypodermic of morphine (gr. $\frac{1}{4}$) may be given for the pain, then hot baths, Epsom salts, diuretics, electricity, iron, and strychnine are all useful.

8. *Symptoms* of belladonna poisoning:—In the first

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stage, that of delirium, there are dryness of the throat, thirst, difficulty of deglutition and spasms upon swallowing liquids, face at first pale, afterwards highly reddened, pulse extremely rapid, eyes prominent, brilliant, with widely-dilated pupils, complete paralysis of accommodation, disturbances of vision, attacks of giddiness and vertigo, with severe headache, followed by delirium, occasionally silent or muttering, but usually violent, noisy, and destructive, accompanied by the most fantastic delusions and hallucinations. Usually the urine is retained, and the body temperature is above the normal. The delirium gradually subsides, and the second stage, that of coma, is established, with slow, stertorous respiration, and gradually failing pulse, until death occurs from respiratory or cardiac paralysis, or sometimes in an attack of syncope during apparent amelioration. (Witthaus.)

Treatment.—The stomach should be washed out; pilocarpin may be given hypodermatically; morphine may be given cautiously during the period of violent excitement; cold applications to the head and artificial respiration are useful. There is no chemical antidote.

9. *Indications*.—To promote uterine contractions during third stage of labor; fibroids, menorrhagia, post-partum hemorrhage. Some forms of amenorrhea and dysmenorrhea, dysentery, arterial hemorrhage, congestive headaches, laxity of sphincters of bladder or rectum, hemorrhoids, aneurysm, diabetes, urinary incontinence, direct paralysis of the sphincter vesicæ, atonic spermatorrhea.

Contraindications.—In labor if the birth canal is not free, and the os uteri is not dilated.

HYGIENE.

1. (1) Malaria, (2) Trichinosis, and (3) Tapeworms.

(1) In the case of *Malaria*.—the destruction of all mosquitoes, or the prevention of inoculation.

(2) In the case of *Trichinosis*.—the meat (of the pig) should be thoroughly cooked; mere curing or smoking will not do. Further, there should be systematic inspection of the meat sold, and the animals should not be fed with the refuse of slaughter-houses.

(3) In the case of *Tapeworms*.—all meat should be thoroughly cooked, and vegetables should be thoroughly cleansed.

3. Diseases communicated by the *Stools*.—Typhoid fever, dysentery, cholera, intestinal tuberculosis. To prevent communication of these diseases, the stools should be received in vessels containing a disinfectant solution in greater quantity than the expected discharge. The whole

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should be thoroughly mixed and allowed to stand for at least one hour before final disposition.

Diseases communicated by the *Sputum*:—Pulmonary tuberculosis and pneumonia. To prevent communication of these diseases, the sputum should be received in vessels containing disinfectant solution, and kept covered when not in use. The contents of the vessel should be burnt, and the vessel washed with disinfectant solution. The patient should not wear either beard or mustache.

STATE BOARD EXAMINATION QUESTIONS.

SOUTH CAROLINA STATE BOARD OF MEDICAL EXAMINERS.

GENERAL ANATOMY.

1. How many bones of the cranium? Name them. How many bones of the face? Name them.
2. What are tendons? Aponeuroses? Fasciæ?
3. Name the superficial muscles of the abdomen. Name the deep muscles of the abdomen.
4. Where does the brachial artery commence and terminate? Name its branches.
5. Give the origin and distribution of the third cranial nerve. Is it a sensory or a motor nerve?

SURGICAL OR REGIONAL ANATOMY.

1. For purposes of spinal anesthesia, or tapping the dural sac for diagnostic purposes, where would you make your puncture, and why?
2. What arteries are in danger in the operation of "paracentesis thoracis," and how would you guard against this?
3. In gunshot wounds of the intestines or bladder, rupture of an abscess or any organ in the abdominal cavity, what position would you place your patient in, and why?
4. Give surface marking of femoral artery. Most favorable point for ligature? Why? Most effectual point of compression in operations on thigh? Why?
5. Give surface marking of common carotid artery. Most favorable point for ligature. Most effectual point of compression in an injury to the external carotid.
6. What is the chief function of the great omentum? In what position would you place your patient to remove the omentum from your field of operation?
7. How would you determine the portion of small intestines in your hand in operations on same?

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8. In fracture of neck of femur, internal to the capsular ligament, what are the characteristic symptoms and their causes? In fracture just below trochanter, what are the symptoms and causes?

9. What cranial nerve is most frequently paralyzed? Name three causes from its origin to distribution and symptoms.

10. What arteries would you tie in pylorotomy?

PHYSIOLOGY.

1. Describe in detail the events that occur during a single cardiac cycle, and the theories of the cause of the heart beat.

2. What are the physical and chemical properties of muscular tissue? What changes take place during muscular action?

3. Classify foods. Define digestion and describe digestion in the stomach and intestines, and state substances absorbed in each.

4. What would be the effect of a transverse section of the anterior root of a spinal nerve? The posterior root? An efferent nerve? An afferent nerve?

5. Enumerate the special centers contained in the medulla, and state over what function or structure each presides.

HYGIENE.

1. Mention some of the diseases induced by industrial pursuits, and give the special cause in each disease, and how prevented.

2. What are the effects of too much shade around a dwelling house, and why?

3. What abnormal conditions of the eyes are most common in school children, and how caused?

4. What derangements are liable to result from improperly constructed desks and seats in schoolrooms?

5. What is "State Medicine?" Discuss its vital importance to promoting a successful nation.

6. What is trachoma, and how should it be handled when occurring in a school child?

7. Define ptomaines, give sources of origin and describe their agency in inducing disease, and give the symptoms produced by them.

8. What are the common impurities of drinking water, and how may such impurities be removed?

9. Mention in order of merit the best means of fumigating by formaldehyde gas. How is the gas formed, and what is the necessary temperature of the room?

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10. Mention the preventable epidemic diseases, and state how you would stop spread of each.

[Juniors answer all of Physiology questions and Nos. 1, 3, 7, 9, 10 of Hygiene. Seniors answer all of Hygiene questions.]

MATERIA MEDICA.

1. Give names of two vasodilators.
2. Give names of two vasoconstrictors.
3. Give names of two hydragogue cathartics.
4. Give names of two cholagogue cathartics.
5. Give dose and therapeutics of each.

THERAPEUTICS.

In treating the following diseases, give dose, frequency of administration, and physiological effect of drugs used; also other remedial measures used, giving the physiological effect and mode of use: 1. Typhoid fever. 2. Bronchitis. 3. Pneumonia. 4. Dysentery. 5. Cholera infantum. 6. Acute nephritis. 7. Acute rheumatism. 8. Acute neuritis. 9. Enterocolitis of infants.

10. Give symptoms of poisoning by lead, opium, strychnine, and arsenic. Also antidotal treatment for each.

CHEMISTRY AND MEDICAL PHYSICS.

1. Give chemical formula for argentic nitrate. How is it used in medicine?
2. Give chemical formula for sodium chloride, and state its chief function in the economy.
3. What is CaSO_4 , and what property makes it useful in surgery?
4. What is the difference between the galvanic and faradic currents?
5. What instruments are used to measure electricity with?

PRACTICAL URANALYSIS, MICROSCOPY, AND TOXICOLOGY.

1. What is a urinometer, and what diseases does it help to diagnose?
2. What constituents help to render the urine acid?
3. Mention the essential parts of a microscope.
4. Give morphological difference between blood and pus corpuscles.
5. Mention some of the most frequent pathological constituents found in the urine under the microscope.
6. What does continuous low specific gravity indicate?
7. When may the specific gravity be below 1010 in health?

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8. How are uric acid crystals deposited in test tubes? Give morphology.
9. Define toxicology.
10. Give symptoms of, and antidotes for, poisoning from cocaine, carbolic acid, and strychnine.

SURGERY.

1. What are general indications in treatment of wounds?
2. Erysipelas. (a) Definition. (b) Prognosis. (c) Treatment.
3. Inflammation. (a) Definition. (b) Varieties. (c) Causes. (d) Treatment.
4. Locate the fissure of Rolando.
5. Abscess of prostate gland. (a) Causes. (b) Symptoms. (c) Treatment.
6. Differential diagnosis and treatment between omental and complete inguinal hernia.
7. Give the several steps in the amputation of the ring finger at the junction of the metacarpophalangeal articulation.
8. Give symptoms and method of reducing backward dislocation of hip.
9. Man forty-five years of age found on street in coma, what is the matter with him, and what is your method of examination?
10. Give differential diagnosis between gumma and epithelioma.

PRACTICE AND DISEASES OF CHILDREN.

1. (a) Etiology, diagnosis, and treatment of cerebral hemorrhage. (b) Differentiate between locomotor ataxia and multiple neuritis.
2. Which of the valvular lesions of the heart is most likely to cause sudden death? Why? (b) What symptoms constitute the Adams-Stokes syndrome? What is the pathology?
3. Commence with the chill and give symptoms and signs of a lobar pneumonia in a man twenty-five years old. Treatment you would use.
4. Give etiology, symptoms, and treatment of acute gastroenteritis.
5. What are the causes of peritonitis?
6. (a) In the third week of typhoid fever, what complication may arise? (b) What measures would you use to reduce temperature in typhoid?
7. Make a diagnosis and give your reasons, from the following history and symptoms: A married woman, age thirty-four, large and fat in person. She has had two

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children and three miscarriages, the last six weeks ago. Otherwise she says her health has always been good until within three or four months; has been in the habit of drinking beer freely. For two weeks there has been pronounced jaundice, anorexia, and bilious vomiting after eating; dizziness, flatulence, occasional diarrhea with pain in the epigastrium, slight edema of the feet and ankles. These symptoms have been increasing. There has been no headache, no hemorrhage, or chills. The tongue was clean, pulse 80, temperature 97.8°. The heart and lungs normal. The liver was much enlarged and smooth. The spleen was felt below the ribs. There was no ascites. Urine sp. gr. 1017, deep yellow color, and containing a trace of albumin and much bile. Sediment normal. Blood examination negative.

8. Pathology and symptoms of primary laryngeal diphtheria. How much antitoxin would you give at a dose, and how often would you repeat it?

9. Give the clinical history of a case of tuberculous meningitis.

10. Clinical evidences and treatment of rickets.

OBSTETRICS AND DISEASES OF WOMEN.

1. What is post-partum hemorrhage, and how would you treat it?

2. (a) What symptoms would cause you to fear the development of eclampsia? (b) What would you do to prevent it? (c) How would you treat it should it occur?

3. (a) What is septicemia? (b) What is sapremia? (c) How would you treat them?

4. (a) What would you do to prevent mastitis? (b) How would you treat it?

5. What are the objections to the use of ergot during labor?

6. What are the dangers to mother and child in a case of breech presentation?

7. What is meant by version, and what are the methods of performing it?

8. Give causes and treatment of dysmenorrhea.

9. (a) When and how would you repair a lacerated perineum? (b) What is the principal muscle torn in this condition?

10. Give treatment (palliative and curative) of a case of retroversion of the uterus.

BACTERIOLOGY AND PATHOLOGY.

1. (a) What is the most effective method of sterilization? (b) How would you sterilize culture media, and why?

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2. Give serum test (Widal reaction) for typhoid fever.
3. Give method of staining cover-glass preparations.
4. Give condition of intestines in acute enterocolitis.
5. Give changes in liver in chronic alcoholism.

MEDICAL JURISPRUDENCE.

1. Give in detail method of examining a body before testifying as an expert at an inquest.
 2. (a) Give difference in entrance and exit in gunshot wounds by (a) soft lead, (b) hard lead, or steel bullet.
 3. How would you distinguish between an incised or punctured wound received before death and immediately after death?
 4. Where death is due to violence, how would you tell whether it was an accident, a homicide, or a suicide? Give an example of each.
 5. Where an abortion has been produced, how would you tell whether it was criminal or accidental?
 6. Has a physician the right to destroy a new-born monster?
 7. Explain the difference between expert and ordinary testimony.
 8. Under what circumstances is a physician excused from obeying a subpoena?
 9. How would you distinguish between feigned and real insanity?
 10. Distinguish between iron rust and blood stain.
- [Juniors will answer Nos. 1, 2, 3, 4, 7 questions on Medical Jurisprudence.]

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

SOUTH CAROLINA STATE BOARD OF MEDICAL EXAMINERS.

SURGICAL OR REGIONAL ANATOMY.

1. For spinal anesthesia the puncture may be made in any intervertebral space below the second lumbar vertebra; the space generally chosen is that between the third and fourth lumbar vertebrae, or the lumbosacral space. The reason is to avoid injury to the spinal cord, which terminates at the level of the lower border of the first lumbar vertebra. In the child, the spinal cord terminates opposite the body of the third lumbar vertebra; hence in children the puncture should be made below the fourth lumbar vertebra.

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2. The intercostals. By inserting the needle nearer the upper than the lower border of the ribs bounding the selected interspace.

3. In all operations in the pelvic and lower part of the abdominal cavities, the patient should be placed in the Trendelenburg position. This causes the intestines and viscera to be displaced away from the field of operation.

4. The surface marking of the femoral artery is a line drawn from a point midway between the anterior superior spine of the ilium and the symphysis pubis to the adductor tubercle just above the internal condyle of the femur.

The most favorable point for ligature is at the apex of Scarpa's triangle, because here the vessel is more superficial, there are no large branches, and fewer important structures.

The most effectual point for compression in operations on the thigh is just below Poupart's ligament, because here the vessel is very superficial, and is separated only by the psoas muscle from the ascending ramus of the pubic bone; hence compression against that bone is easy and effectual.

5. The surface marking of the common carotid artery is a line drawn from the sternoclavicular articulation to the lobule of the ear, but the artery only extends as high up as the upper border of the thyroid cartilage.

The most favorable point for ligature is at the level of the cricoid cartilage in the superior carotid triangle, above the omohyoid muscle.

The most effectual point for compression is against the anterior tubercle of the transverse process of the sixth cervical vertebra (on a level with the cricoid cartilage).

6. The chief function of the great omentum is to afford protection to the small intestine.

In the Trendelenburg position.

7. "The jejunum is wider than the ileum (its diameter being a quarter of an inch greater than that of the ileum), and its coats are thicker and more vascular. If the gut be empty, and can be rendered translucent by being held against the light, the lines of the valvulae conniventes can be well seen. These folds are large and numerous in the jejunum, but become small and scanty in the upper ileum, and are wanting in the lower third of that bowel." (Treves, *Surgical Applied Anatomy*.)

8. In intracapsular fracture: Swelling in front, just below Poupart's ligament, due to effusion of blood or to projection of the fragments. Shortening brought about by muscular contraction. Eversion or rotation outward, due to the weight of the limb, or the fact that the neck is often more extensively fractured behind, or it may be due to

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muscular action. In fracture below the trochanter the lower fragment is drawn up behind the upper one by the hamstrings, aided by the rectus, gracilis, sartorius, tensor vaginae, and adductors, and is carried a little to its inner side under the influence of the last-named muscles. The lower end of the upper fragment usually projects forward and a little outward. This is produced by the agency of the lower fragment, which tilts the upper piece of bone in the direction named. In the fracture of the upper third of the shaft the projection forward of the upper fragment is aided by the ilio-psoas muscle." (Treves' *Surgical Applied Anatomy*.)

9. "The paralysis may depend either upon (1) central causes—i.e. blood-clots or intracranial tumors pressing on the nerve before its entrance into the internal auditory meatus. It is also one of the nerves involved in *bulbar paralysis*; or (2) it may be paralyzed in its passage through the petrous bone by damage due to *middle-ear disease* or *b^y fractures of the base*; or (3) it may be affected at or after its exit from the stylo-mastoid foramen. This is commonly known as *Bell's paralysis*. It may be due to exposure to cold or injury of the nerve either from accidental wounds of the face or during some surgical operation, as removal of parotid tumors, opening of abscesses, or operations on the lower jaw." (Gray's *Anatomy*.)

10. The arteries to be tied in pylorectomy are: The gastric, the pyloric branch of the hepatic, the right and left gastropiploics, the gastroduodenal.

PHYSIOLOGY.

2. The *physical properties* of muscular tissue are: Elasticity, cohesion, tonicity, irritability (to mechanical, chemical, electrical, or thermic stimuli), contractility, and conductivity.

The *chemical properties* include: Power of consuming oxygen and of excreting carbon dioxide and sarcolactic acid; acid reaction; the plasma can also coagulate.

During contraction the following changes take place in a muscle: (1) It becomes shorter and thicker, but (2) there is no change in volume; (3) there is an increased consumption of oxygen; (4) more carbon dioxide is set free; (5) sarcolactic acid is produced; and hence (6) the muscle becomes acid in reaction; (7) it becomes more extensible, and (8) less elastic; (9) there is an increase in heat production and consequently a rise of temperature; (10) the electrical reaction becomes relatively negative, and (11) a sound is produced.

3. Foods are classified as follows:

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I. Inorganic	{	Water.
	{	Salts.
II. Organic	{	Non-nitrogenous { Carbohydrates.
	{	Fats.
	{	Nitrogenous—Proteids.

Digestion is the process by which the food is converted into material suitable for absorption and assimilation.

Substances that may be absorbed in the *stomach* are: Water, alcohol, salts, sugars, and dextrins that may have been converted from starch by the ptyalin of the saliva, and proteoses and peptones resulting from peptic digestion of proteids.

Substances that may be absorbed in the *intestines* are: Water, sugars, proteoses, peptones, and fats.

4. Transverse section of the *anterior root* of a spinal nerve causes loss of motion and degeneration of the peripheral portion of the anterior root fibers; the sensory fibers of the posterior root are not affected.

Transverse section of the *posterior root* of a spinal nerve causes loss of sensation and degeneration, which latter differs according as the section is made on the proximal or peripheral side of the ganglion. If the section is made between the cord and the ganglion, degeneration only occurs in the piece severed from the ganglion, but connected with the cord. If the section is made beyond the ganglion, degeneration occurs in the fibers peripheral to the lesion.

If an *efferent* nerve is severed, it will no longer convey impulses from the brain or cord.

If an *afferent* nerve is severed, it will no longer convey impulses to the brain or cord.

5. The special centers contained in the medulla are those for the following functions or actions: Respiration, salivary secretion, mastication, sucking, deglutition, speech production, facial expression; it also contains the cardiac and vasomotor centers.

HYGIENE.

1. "Pulmonary phthisis: Accountants, bookkeepers, clerks, compositors, pressmen, marble and stone-cutters. Fibroid phthisis from dust: Grinders, file-cutters, potters, glass polishers, wool and cotton spinners, millers. Anthrax: Skin handlers. Internal anthrax: Wool and rag sorters. Glanders and tetanus: Hostlers. Anemia, gastric ulcer, eczema, erythema nodosum: Domestic servants (female). Varicose veins: Coachmen, shop girls, and others accustomed to long maintenance of the standing or part standing position. Writers' cramp (scriveners' palsy): Clerks and writers. Septic infection: Butchers and slaughter-house

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employees. Conjunctivitis: Electric light workers (probably caused by actinic rays). Nystagmus: Miners. Emphysema: Players upon wind instruments. Insomnia, dyspepsia, disease of liver and kidneys, neurasthenia, irritable heart, apoplexy, and paralysis: Brain workers. Typhoid fever, pneumonia, cardiovascular, and renal diseases, morphine and cocaine habits: Physicians. Lead poisoning: Lead miners and smelters, painters, gilders, makers of white and red lead, seamstresses (from silk thread loaded with acetate of lead), makers of artificial flowers. Mercurial poisoning: Cinnabar miners, makers of cheap looking-glasses or mirrors, and makers of felt hats. Arsenical poisoning: Wall-paper workers (formerly), workers on artificial flowers and fancy glazed-paper boxes. Phosphorus poisoning: Matchmakers. Chromium and zinc poisoning: "Founders' ague" in brass foundries. Disease of hair follicles: Operatives in oil refineries and paraffin works." (*Butler's Diagnostics of Internal Medicine.*)

2. Too much shade favors dampness, and the multiplication of molds and bacteria, which are readily conveyed into the house. Insects, mosquitos, etc., are also harbored. Further, absence of sunlight is an etiological factor of anemia and debility.

3. Myopia, hypermetropia, astigmatism, strabismus, and trachoma are the abnormal conditions of the eyes most common in school children.

4. Improperly constructed desks and seats are liable to cause spinal curvature, round shoulders, compression of the thorax, and defective vision.

5. "State medicine" comprises all those branches of medical science which are concerned with public health, vital statistics, registration of diseases, quarantine, etc.

6. Trachoma is a contagious conjunctivitis, accompanied with granulations on the eyelids, and later on with cicatricial contraction or other deformity of the eyelids. Constant inspection and isolation of all cases are essential, in addition to the general treatment.

8. The common impurities of drinking water are: Calcium and magnesium salts, decayed animal or vegetable matter, sewage, disease germs, animalculæ, dust, and dirt. The best way to remove the impurities is by distilling or by boiling and filtering.

10. Probably all the epidemic diseases are preventable; certainly smallpox, typhoid, diphtheria, malaria, and yellow fever can be prevented. The spread of any epidemic can be prevented by proper isolation, quarantine, and hygiene; and by the use of special precautions such as vaccination

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(for smallpox), immunizing doses of antitoxin (in diphtheria), keeping out or destroying mosquitos (in malaria and yellow fever), etc.

MATERIA MEDICA.

1. Two vasodilators: Spirit of glonoin (nitroglycerin), dose $\mathfrak{m}\mathfrak{j}$; liquor ammonii acetatis, dose $\mathfrak{z}\mathfrak{i}\mathfrak{v}$.
2. Two vasoconstrictors: Ergot, dose of fluid extract, $\mathfrak{m}\mathfrak{x}\mathfrak{x}\mathfrak{x}$; adrenalin, dose of the chloride in solution of 1:1000, $\mathfrak{m}\mathfrak{x}\mathfrak{v}$ -x.
3. Two hydragogue cathartics: Croton oil, dose $\mathfrak{m}\mathfrak{j}$; elaterin, dose gr. 1/10.
4. Two cholagogue cathartics: Podophyllum, dose gr. x; massa hydrargyri, dose gr. j-x.
5. For doses, see questions 1 to 4 above.

THERAPEUTICS.

10. The symptoms of acute lead poisoning are: "Metallic taste; dryness of the throat; thirst; severe colicky abdominal pains, referred particularly to the umbilical region, and relieved by pressure; pulse very feeble and slow; great prostration; constipation; urine scanty and red; violent cramps; paralysis of the lower extremities; convulsions, and tetanic spasms."

The antidotal treatment consists in administering "magnesium sulphate, which brings about the formation of the insoluble lead sulphate, while the purgative action of the magnesia is also useful. It should be preceded by an emetic, or by the use of the stomach tube."

The symptoms of poisoning by opium are as follows: "At first there is usually a period of excitation, marked by restlessness, great physical activity, loquacity, and hallucinations. The patient then becomes weary, dull, and drowsy; he yields to the desire for sleep, from which at first he may be roused. The lips are livid, the face pale, the pupils contracted, and the surface bathed in perspiration. The condition of somnolence rapidly passes into narcosis. The patient cannot be roused, and lies motionless and senseless, with completely relaxed muscles. The pulse, at first full and strong, becomes feeble, slow, irregular, and easily compressible; the respiration slow, shallow, stertorous, and accompanied by mucous râles. The patient rapidly becomes comatose, and, in fatal cases, dies in from forty-five minutes to fifty-six hours, usually in from twelve to eighteen hours. In cases of recovery after the stage of narcosis, the pulse and respiration gradually return to the normal, and the condition of coma passes into one of deep sleep, lasting twenty-four to thirty-six hours."

Treatment: "Wash out the stomach with a dilute solu-

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tion of potassium permanganate, leaving about 500 c.c. in the stomach, and in maintaining the respiration. In the first or second stage the 'ambulatory treatment' should be adopted to prevent, if possible, the establishment of the third stage. If this stage develop, the main reliance is to be placed in maintaining the respiration by artificial methods, until the poison has been eliminated. Strong coffee, or caffeine, by the mouth or rectum, are of benefit. The same cannot be said of atropin. The urine should be drawn by the catheter."

The *symptoms of poisoning by strychnine* are as follows: "Strychnine produces a sense of suffocation, thirst, tetanic spasms, usually opisthotonos, sometimes emprosthotonos, occasionally vomiting, contraction of the pupils during the spasms, and death, either by asphyxia during a paroxysm, or by exhaustion during a remission. The symptoms appear in from a few minutes to an hour after taking the poison, usually in less than twenty minutes; and death in from five minutes to six hours, usually within two hours."

Treatment: "The convulsions are to be arrested or mitigated by bringing the patient under the influence of chloral or chloroform as rapidly as possible; the stomach is to be washed out, and the patient is to be kept as quiet as possible."

In *poisoning by arsenic*: *Symptoms*: "In acute cases the symptoms usually begin in from twenty to forty-five minutes. Nausea and faintness. Violent, burning pain in the stomach, which becomes more and more intense, and increases on pressure. Persisting and distressing vomiting of matters, sometimes brown or gray, or streaked with blood, or green (Paris green). Purging. More or less severe cramps in the lower extremities."

In *chronic cases*: "Inflammation of the conjunctivæ, with intolerance of light. Irritation of the skin, accompanied by an eruption (eczema arsenicale). Local paralyses. Great weakness and emaciation. Exfoliation of the cuticle and falling out of the hair."

The *antidote* is freshly prepared ferric hydroxide.—(From Witthaus' *Essentials of Chemistry*.)

CHEMISTRY AND MEDICAL PHYSICS.

1. The formula for argentic nitrate is: AgNO_3 . It is used in medicine, *locally* as a stimulant, an astringent, a caustic, an escharotic, and an antiphlogistic. *Internally* it is used for ulcer and inflammation of the stomach and intestines; also in some forms of nervous diseases.

2. The chemical formula for sodium chloride is: NaCl . Its chief function in the economy is to aid in the process

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of osmosis, to aid in holding certain proteins in solution, and it is probably the source from which the hydrochloric acid of the stomach is derived.

3. CaSO_4 is calcium sulphate, called also plaster-of-Paris. It has the property of being able to take up water, when mixed with it, to form a hard and solid mass.

4. The galvanic current is constant and continuous; it always flows in the same direction; it has pronounced chemical and thermal effects.

The faradic current is a rapid succession of momentary impulses; the direction is not constant; the chemical and thermal effects are almost imperceptible.

5. The galvanometer, voltmeter, amperemeter, ohmmeter, coulombmeter, joulemeter, miliammeter.

PRACTICAL URANALYSIS, MICROSCOPY, AND TOXICOLOGY.

1. A urinometer is a form of hydrometer used for determining the specific gravity of the urine. It may be a help in the diagnosis of diabetes mellitus, diabetes insipidus, some diseases of the kidneys, chronic wasting diseases.

2. The acidity of the urine is chiefly due to the presence of acid sodium phosphate; also to some slight extent to uric acid and to carbonic acid.

3. The essential parts of a microscope are: The objective lenses, the eyepiece, the base, pillar, body, draw tube, coarse and fine adjustments, stage, mirror, diaphragm, condenser, and nosepiece.

4. Pus corpuscles are readily distinguished from blood corpuscles by being larger, distinctly granular, with an irregular outline.

5. Some of the most frequent pathological constituents found in the urine under the microscope are: Blood, pus cells, casts, cylindroids, epithelium, clap-threads, crystals, pathogenic bacteria, and foreign matter.

6. Continuous low specific gravity of the urine may indicate: Diabetes insipidus, chronic interstitial nephritis, or contracted kidney.

7. The specific gravity may be below 1010 in health:—when the person ingests a large quantity of fluid or voids more urine than normal.

8. Uric acid crystals may be deposited as a brick-dust sediment. They are found as rhombic plates with rounded edges, as tube shaped or pointed crystals, as lozenge shaped, and arranged in bundles or as crosses; they are generally more or less colored by the urinary pigments.

9. By *toxicology* is meant that branch of medical science which appertains to poisons; it includes their character, origin, actions, symptoms produced, antidotes, treatment, and detection.

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10. In *cocaine poisoning* there will be found pain and fullness in the head, pulse first quick, later feeble and slow, extremities cold. The symptoms are not constant.

The *antidote* is said to be amyl nitrite.

Symptoms in carbolic acid poisoning: Buccal mucous membrane is whitened and hardened; vomiting; burning pain in mouth, esophagus, and stomach; pulse and body temperature are lowered; the pupils are contracted; collapse, and finally death. The urine may become dark.

The *antidote* is said to be alcohol.

For *strychnine poisoning*, see above, THERAPEUTICS, question 10.

SURGERY.

1. The general indications in the treatment of wounds are: To stop the bleeding, combat shock, remove foreign bodies and dead tissue, make aseptic, put the edges in apposition, drain (if necessary), dress, secure rest to the part, allay undue pain, and combat inflammation.

4. Draw a straight line over the top of the scalp from theinion to the glabella; bisect this line, and half an inch posterior to the midpoint draw a line downward and forward at an angle of 67.5° for a distance of three and one-half inches. This line will represent the location of the fissure of Rolando.

6. An *omental hernia* is dull on percussion, does not yield a gurgle on manipulation, is firm and lobulated on palpation; whereas an *enterocele* is tympanitic on percussion, yields a gurgle on manipulation, and is smooth and elastic on palpation.

7. "The incision begins just above the head of the metacarpal, on its dorsal aspect—passes down the median dorsal aspect over the prominence of the knuckle, to just beyond the base of the first phalanx; at this point the hitherto median incision diverges into two symmetrical limbs—each sweeping across the dorso-lateral aspect of the finger to just below the junction of the finger with the web—and thence transversely across the palmar surface in the line of the crease, on a level with the free border of the web, coming to the opposite side just below the junction of the web with the finger. This rather extensive incision is best made with three strokes—from commencement to web of one side—from point of divergence of median line to web of opposite side—and across palmar surface connecting the two limbs. The above incision through skin and fascia is now deepened. The palmar portion is cut to the bone while the finger is forcibly extended. The lateral portions are carried to the bone, cutting the lumbricales and interossei. The soft parts are retracted to the joint line. The

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extensor tendons are then cut and the joint thus entered from the dorsum—the lateral ligaments and glenoid ligament being cut from within and the disarticulation completed. The two digital arteries are tied and the synovial sheath closed. The edges of the sides of the oval are sutured in one vertical, anteroposterior line, in continuation with the queue of the incision. The splint applied should include the wrist-joint." (Bickham's *Operative Surgery*.)

10.—

GUMMA.	EPITHELIOMA.
1. May occur in early or middle life.	1. Occurs late in life.
2. More rapid growth.	2. Slower growth.
3. History and signs of syphilis.	3. No such history or signs.
4. Follows secondary stage of syphilis.	4. Usually begins as a pimple or a wart.
5. Responds to mercury and potassium iodide.	5. Does not respond to medicines.
6. Not very painful.	6. Is attended by lancinating pain.
7. Ulceration generally multiple.	7. Ulceration single.
8. Edges not everted.	8. Edges everted and raised.
9. But little enlargement of lymph nodes.	9. Lymph nodes enlarged.
10. Induration less marked.	10. Induration more pronounced.

PRACTICE AND DISEASES OF CHILDREN.

1. (b)

LOCOMOTOR ATAXIA	MULTIPLE NEURITIS.
1. Slow onset.	1. More rapid onset.
2. Lightning pains.	2. No lightning pains, but the muscles are tender to pressure.
3. Argyll-Robertson pupil.	3. No Argyll-Robertson pupil.
4. Girdle sensation.	4. No girdle sensation.
5. No actual loss of power.	5. Actual loss of power.
6. No paralysis or wasting of muscles.	6. Paralysis and wasting of muscles are present.

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2. Aortic regurgitation is the valvular lesion of the heart most likely to cause sudden death. The suddenness of the death is due to paralysis of the left ventricle during diastole.

The *Adams-Stokes syndrome* is a pulse permanently slow, and accompanied by attacks of vertigo or syncope. It is supposed to be the "result of changes in the pneumogastric centers due to disease of the arteries of the medulla."

7. "Gallstone in the common duct is possible but unlikely, owing to the presence of splenic tumor, the lack of any intermission in the symptoms and the absence of pain, fever, or chills. Catarrhal jaundice cannot be excluded, though it rarely leads to much enlargement of the liver or spleen. The points against cancer are the absence of pain, cachexia, or irregularities on the liver surface. Syphilis might produce all these symptoms and can be positively excluded only by the therapeutic test. *Cirrhosis, or the combination of cirrhosis and fatty infiltration, is the most likely diagnosis.* This accounts better than any other hypothesis for the splenic enlargement, the large, smooth liver, and the jaundice. The gastric symptoms would then result from passive congestion of the stomach." (*Cabot's Case Teaching in Medicine*, from which the question also is taken.)

8. In laryngeal diphtheria the dose of antitoxin is from 2,500 to 4,000 units, according to the age of the patient. The dose can be repeated in twelve hours if there is no marked improvement in the patient's condition.

OBSTETRICS AND DISEASES OF WOMEN.

5. The objections to the use of ergot during labor are: (1) That it may produce tetanic contractions of the uterus and so cause rupture of the uterus, death of the mother, or asphyxiation of the child; (2) that it increases the chances of lacerations of the cervix and perineum; (3) that it tends to cause retention of clots and membranes, etc.; and (4) that it retards the secretion of milk.

6. The dangers to mother and child in a case of breech presentation are: (1) Compression of the umbilical cord; (2) premature respiration; (3) asphyxiation of the child; (4) the child may suffer from fractures, dislocation, hemorrhage, or paralysis; (5) extension of the head, or of the arms over the head; (6) increased tendency to rupture of the perineum.

9. (a) The perineum should be repaired, if possible, immediately after labor, or within twenty-four hours.

(b) The principal muscle torn is the Transversus perinei.

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10. The *palliative* treatment of retroversion of the uterus consists in: (1) Removing the cause, if possible; (2) replacing the uterus; (3) keeping the uterus in position by means of pessaries, tampons, and knee-chest position; (4) tampons, ichthyol, pelvic massage, and vaginal douches; (5) the enforcing of proper hygiene, particular attention being paid to the bowels, clothing, and exercise.

Curative treatment is operative, and the choice lies between ventral suspension of the uterus and shortening of the round ligament.

BACTERIOLOGY AND PATHOLOGY.

1. (a) The most effective method of sterilization is, for objects capable of withstanding it, *dry heat*.

(b) Culture media are best sterilized by streaming steam, because hot air sterilization would cause the water in the culture media to evaporate.

2. The Widal serum reaction "depends upon the fact that serum from the blood of one ill with typhoid fever, mixed with a recent culture, will cause the typhoid bacilli to lose their motility and gather in groups, the whole called 'clumping.' Three drops of blood are taken from the well-washed aseptic finger tip or lobe of the ear, and each lies by itself on a sterile slide, passed through a flame and cooled just before use; this slide may be wrapped in cotton and transported for examination at the laboratory. Here one drop is mixed with a large drop of sterile water, to redissolve it. A drop from the summit of this is then mixed with six drops of fresh broth culture of the bacillus (not over twenty-four hours old) on a sterile slide. From this a small drop of mingled culture and blood is placed in the middle of a sterile cover-glass, and this is inverted over a sterile hollow-ground slide and examined. . . . A positive reaction is obtained when all the bacilli present gather in one or two masses or clumps, and cease their rapid movement inside of twenty minutes." (From Thayer's *Pathology*.)

MEDICAL JURISPRUDENCE.

2. (a) In gunshot wounds by *soft lead bullets*, the *wound of entrance* is often smaller than the ball (skin stretched at the moment of impact and contracted after perforation); it is depressed, and the edges are contused and inverted, and if the weapon is fired within ten feet usually are blackened from powder and contain powder grains. If the wound is much larger than the bullet, it means that some foreign body has been carried in.

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The *wound of exit* is everted, "triangular, linear, or stellate," and much larger than the wound of entrance.

(b) In gunshot wounds by *hard lead, or steel bullets*, the *wound of entrance* is usually as large as the ball, the skin may be split or may be perforated, and foreign bodies are not carried by the ball into the tissue.

The *wound of exit*, if not in the region of explosive action, may be a little larger or a little smaller than the bullet, but is not noticeably larger than the wound of entrance. If within the area of explosive action, the wound of exit is much larger than the wound of entrance, and is irregular and everted. (From Da Costa's *Modern Surgery*.)

3. It is impossible to distinguish between an incised or punctured wound received *before* death and *immediately after* death.

6. One has no right to destroy a new-born monster.

7. In *expert* testimony, the witness may give his *opinion* on facts or supposed facts as noted by himself or asserted by others. *Theoretically*, this can only be done by those perfectly familiar with the subject in question; but *practically* any (or almost any) physician with a license to practise is accepted as an expert witness.

In *ordinary* testimony, the witness testifies only to *facts* which he has seen, or heard, or with which he has become acquainted by personal observation.

8. A physician would probably be excused from obeying a subpoena under the following circumstances, accompanied by an affidavit in proper form: (1) If the physician himself were ill in bed; (2) if he were in actual attendance upon a patient, where his presence was absolutely requisite, and he could not leave without endangering the patient; (3) if he were in attendance upon a very contagious case, such as smallpox or erysipelas, in which case his presence in court would be dangerous.

9. In *feigned insanity*: There is generally a very obvious motive for the claim of insanity; it is not urged until after the committal of some crime, or until there is some benefit to be derived from the plea of insanity; the person is generally very desirous of being considered insane, and urges his claims in this direction. It is often impossible to distinguish feigned from real insanity.

10. Some of the material from the suspected stain is thoroughly mixed with a few drops of a saturated solution of sodium chloride, and then allowed to evaporate to dryness on a slide covered with a cover-glass. Now add a drop of glacial acetic acid to the slide, and allow it to enter under the cover slip; then apply gentle warmth.

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If the suspected stain is *blood*, crystals of hemin will form later, and can be seen under the microscope; this will not be the case with *iron rust*.

STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS, SOUTH DAKOTA.

CHEMISTRY.

1. Define an atom, a molecule, chemical affinity, chemical action, atomic weight.
2. Phosphorus—state its source, enumerate its properties, and name some solvents.
3. What is the difference between a salt, an acid, and an acid salt? Give an example of each.
4. What is the ordinary source of glycerine? Give its formula. Write an equation showing the process of its preparation.
5. Give in detail your method of examination of urine for three abnormal constituents, and state the clinical significance of each.

EYE, EAR, NOSE, AND THROAT.

1. Give symptoms and treatment in detail of lachrymal stricture.
2. Define mydriasis, myosis. Name some drugs which produce each condition. What is the Argyll-Robertson pupil? In what diseased condition is it found?
3. What are the diseases of the middle ear? Outline your treatment of any one disease. What complications are liable to occur?
4. Give symptoms and treatment of abscess of frontal sinus.
5. Define dysphagia, aphonia, dysphonia.

JURISPRUDENCE AND TOXICOLOGY.

1. How could you determine whether death was due to freezing or that the freezing had occurred after death, in a body found frozen?
2. Describe one or more chemical tests for blood that may be used in investigating suspected blood stains.
3. What is a "live birth," medicolegally? How would you determine whether a dead infant had lived or was "dead-born"?
4. What post-mortem appearances would indicate poisoning by phosphorus, arsenic, strychnine?
5. Give the symptoms, treatment, and post-mortem appearances of poisoning by carbolic acid.

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PRACTICE AND THERAPEUTICS.

1. Differentiate toxic effects of strychnine and tetanus poison.
2. Diagnose bronchopneumonia.
3. Inform me on rheumatoid arthritis.
4. How can you make early diagnosis of tuberculous infection?
5. Mention two remedies which are used to check the secretion of milk.
6. Give symptoms and treatment of migraine.
7. Differentiate organic and functional heart murmur.
8. Give diagnosis, prognosis and management of aneurysm of the thoracic aorta.
9. Mention diseases in which the patellar reflex is exaggerated.
10. Differentiate scarlet fever and measles and suggest treatment for both.

PATHOLOGY.

1. Mention a few symptoms caused by toxins produced within the body.
2. Describe gliomata.
3. What do you understand "Wallerian degeneration" to signify?
4. What pathological conditions increase the elimination of urea?
5. Define hyperinosis, hydremia, melanemia, and hemoglobinemia.
6. Name some of the causes of active hyperemia.
7. What conditions give immunity from the pathogenic action of bacteria?
8. Amyloid degeneration—what do you know about it?
9. Give the pathology of locomotor ataxia.
10. What is embolism, a thrombus, an infarct?

PHYSIOLOGY.

1. Describe the functions of the kidneys, and name the products excreted.
2. Tell what you know about osmosis, and give examples of some.
3. What is color blindness, and what colors are usually indistinguishable to a person so affected?
4. What is the variation of temperature, in health, between childhood and old age, and how is the normal temperature of the body maintained?
5. Describe the normal heart sounds, and explain cause of same.
6. What is the cause of stammering and stuttering?

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7. What diseases are usually quarantined, and for what length of time?
8. How many different kinds of blood corpuscles in the human body, and what are their relative numbers in health?
9. Name the active principles of the digestive secretions, and explain how each affects the food.
10. Name and describe the normal respiratory sounds of the lungs.

ANATOMY.

1. How many bones in the human body?
2. Describe the meibomian glands.
3. What muscles are attached to the great trochanter of the femur?
4. Describe the tibia, and state what bones it articulates with.
5. How many bones in the hand? Name them.
6. Name and describe the salivary glands.
7. Describe the mammary gland, and give nerve and blood supply.
8. Where is the popliteal space, and what structures are contained therein?
9. What cavities may require tapping, and for what diseases, and at what points should the punctures be made?
10. What structures would be severed in an amputation at the middle of the humerus?

OBSTETRICS.

1. Describe the indications of pregnancy at the beginning of the third, sixth, and ninth months.
2. Name the principal diseases and conditions during pregnancy said to be caused by that condition.
3. Give causes, diagnosis, dangers, and treatment of antepartum hemorrhage. Also of postpartum hemorrhage.
4. In vertex presentation, after dilatation, how would you tell the position from internal examination alone? Describe a given case.
5. When during delivery would you use an anesthetic, and how? When is it contraindicated? Name your choice of anesthetic, with reason therefor.
6. What do you do to prevent laceration of the perineum?
7. Describe a well-marked case of puerperal sepsis, giving time of invasion, symptoms, course, and treatment.
8. How would you treat a shoulder presentation with arm down?
9. What is involution, and how long does it normally continue?
10. How, and how long would you treat a babe apparently dead when born?

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DISEASES OF WOMEN.

1. Describe the preparation for, and the manner of opening and closing the abdominal wall in a laparotomy.
2. Describe a uterine curettement and its dangers. When should it be employed?
3. Differentiate simple from gonorrheal vaginitis, and give treatment for each.
4. Describe pruritus vulvæ, giving causes and treatment.
5. Describe a case of endometritis, and give treatment.

BACTERIOLOGY.

1. Define immunity. Explain (a) how acquired, (b) how destroyed.
2. Name the three most important culture media.
3. Give method of staining gonococci.
4. Give the cultural and microscopic points of difference between the *Bacillus coli communis*.
5. Explain the Widal reaction.

SURGERY.

1. Classify burns. Give methods of treatment.
2. What is shock? How would you treat the shock accompanying a severe injury of an extremity? State conditions under which amputation would or would not be justifiable.
3. In what manner may operative work be affected by (a) alcoholism, (b) leucocythemia, (c) diabetes, (d) atheroma, and (e) good health?
4. Mention the characteristic symptoms of fracture of the clavicle, and give a method of treatment.
5. Differentiate elbow joint injuries, and describe method of reduction and after-treatment of backward dislocation of this joint.
6. What are the causes of abscess of the frontal sinus? Outline its symptoms, treatment, and prognosis.
8. What is osteomyelitis? Mention the different varieties. Describe a case of acute infective osteomyelitis, giving briefly its causes, diagnosis, treatment, and prognosis.
9. What is an aneurysm? What are its predisposing and exciting causes, and the usual locations?
10. Give symptoms, diagnosis, and treatment of gastric ulcer.

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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS, SOUTH DAKOTA.

CHEMISTRY.

1. An *atom* is the smallest quantity of an element that can enter into chemical action, or that can enter into the composition of a molecule.

A *molecule* is the smallest quantity of any substance (element or compound) that can exist in a free state.

Chemical affinity is the attraction that exists between atoms, whereby they are united to form molecules.

Chemical action is the action of one substance upon another whereby chemical change is produced.

Atomic weight is the weight of an atom of an element as compared with the weight of an atom of hydrogen.

2. PHOSPHORUS.—*Source*: From the phosphates. *Properties and solvents*: It is a solid, with a valence of three or five, an atomic weight of 31. The molecule consists of four atoms; it combines readily with oxygen and is an active reducing agent. It exists in four allotropic conditions—the yellow, red, black, and white varieties; the two former are the most frequently met with and have different physical properties, as follows: The *yellow* “when freshly prepared, and at ordinary temperatures, forms a yellowish, translucent solid, which, on exposure to light, becomes more darkly colored and opaque. It has the consistence of wax. When exposed to the air it gives off white fumes and an odor of garlic. At 32° F. it becomes brittle; at 111° F. it melts to a yellowish liquid, and at 554° F., in the absence of air, is converted into a colorless vapor. In air, at 140° F., it ignites, burning with a bright flame and giving off dense white fumes and producing ozone. In the dark this form of phosphorus gives off a peculiar pale light. It is insoluble in water, sparingly soluble in alcohol, ether, and the fatty and ethereal oils; very soluble in carbon disulfid, from which solution it separates in the form of crystals. This variety is exceedingly poisonous.

“The *red* variety is red, brown, or dark yellow in color. It may be heated to 482° F. without melting, but at that temperature it is suddenly converted into the yellow variety, which ignites with an explosion. It fires much less readily than yellow phosphorus, and may be kept dry, while the yellow must be preserved under water. It has no odor or taste, and is insoluble in those substances which dissolve the other form. It is not luminous at ordinary temperatures.”—(Witthaus' *Essentials of Chemistry*.)

3. A *salt* is a substance formed by the substitution of an

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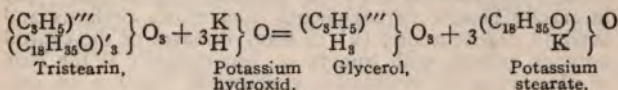
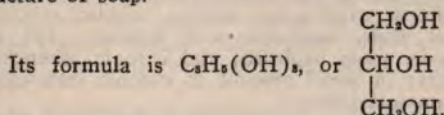
electro-positive element for part or all of the replaceable hydrogen of an acid.

An *acid* is a compound of an electro-negative element or radical with hydrogen, part or all of which hydrogen it can part with in exchange for an electro-positive element without the formation of a base.

An *acid salt* is a salt in which only part of the replaceable hydrogen of an acid has been replaced.

Examples: H_2SO_4 in an *acid*; Na_2SO_4 and NaHSO_4 are both *salts*; but NaHSO_4 is an *acid salt*.

4. Glycerin is obtained as a by-product in the manufacture of soap.



5. To examine for *albumin*: "The urine must be perfectly clear. If not so, it is to be filtered, and, if this does not render it transparent, it is to be treated with a few drops of magnesia mixture, and again filtered.

"The reaction is then observed. If it be acid, the urine is simply heated to near the boiling point. If the urine be neutral or alkaline, it is rendered *faintly* acid by the addition of dilute acetic acid, and heated. If albumin be present, a coagulum is formed, varying in quantity from a faint cloudiness to entire solidification, according to the quantity of albumin present. The coagulum is not redissolved upon the addition of nitric acid."

To examine for sugar: First remove any albumin that may be present, then "render the liquid strongly alkaline by addition of sodium carbonate. Divide about 6 c.c. of the alkaline liquid in two test-tubes. To one test-tube add a very minute quantity of powdered subnitrate of bismuth, to the other as much powdered litharge. Boil the contents of both tubes. The presence of glucose is indicated by a dark or black color of the bismuth powder, the litharge retaining its natural color."

To examine for indicanuria: "The urine is mixed with one-fifth of its volume of 20 per cent. solution of lead acetate and filtered. The filtrate is mixed with an equal volume of fuming hydrochloric acid containing 3:1000 of ferric chloride, a few drops of chloroform are added, and

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the mixture strongly shaken one to two minutes. With normal urine the chloroform remains colorless or almost so; but if an excess of indoxyl compounds be present the chloroform is colored blue, and the depth of the color is a rough indication of the degree of the excess."

Albumin is found in the urine: "(1) In fevers, as typhoid and pneumonia. (2) In valvular heart lesions, degeneration of the heart muscles, diseases of the coronary arteries, impeded pulmonary circulation, in pregnancy by pressure upon the renal veins, in intestinal catarrh and in Asiatic cholera. (3) In purpura, scurvy, leukemia, pernicious anemia, jaundice, diabetes and syphilis. (4) After taking Pb, Hg, I, P, As, Sb, chloroform, cantharides, oxalic, carbolic, salicylic or the mineral acids, turpentine and nitrates. (5) In large amounts in acute nephritis, and chronic parenchymatous nephritis; in small amount in chronic interstitial nephritis and amyloid kidney."

Sugar is found in urine as "*transitory glycosuria*," "(1) in certain hepatic derangements, congestion, cirrhosis and amyloid degeneration; (2) in many diseases of the central nervous system, with tumors or hemorrhages at the base of the brain, in meningitis, concussion, fracture of cervical vertebrae, railway injuries, in epileptic and apoplectic seizures, and also in certain diseases of the peripheral nervous system, as in sciatica and in tetanus; (3) in acute febrile diseases, pneumonia, typhoid, acute articular rheumatism, scarlatina, etc., particularly during convalescence; (4) under the influence of many poisons, such as curare, chloral, carbon monoxide, morphine, arsenic, and the anesthetics. As '*permanent glycosuria*' (1) in lesions of the brain involving the floor of the fourth ventricle; and (2) in diabetes mellitus."

Indicanuria is found "in hypochlorhydria; in hyperchlorhydria of gastric ulcer; in conditions in which there is diminished peristalsis of the small intestines, as in ileus and peritonitis, not in simple constipation; also in conditions in which putrefactive changes occur in the body elsewhere than in the intestine, as in empyema, putrid bronchitis, gangrene of the lungs, etc." (From Witthaus' *Essentials of Chemistry*.)

EYE, EAR, NOSE, AND THROAT.

2. *Mydriasis* is the condition of extreme dilatation of the pupil of the eye.

Myosis is the condition of extreme contraction of the pupil of the eye.

Mydriatics: Atropine, homatropine, daturine, duboisine, hyoscyamine, cocaine.

Myotics: Eserine, pilocarpine, opium.

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Argyll-Robertson pupil is the condition of the pupil in which it responds to accommodation, but not to light.

It is found in locomotor ataxia, general paralysis of the insane, and sometimes in cerebral syphilis.

4. *Abscess of frontal sinus*.—Symptoms: Intense frontal headache, which may become worse on lying down; pus may be discharged from the nose, chiefly on rising in the morning; pain on blowing the nose; the upper eyelid may be swollen; the mucous membrane of the middle turbinated bone will be found swollen and hyperemic.

Treatment: Establish free drainage; a spray of suprarenal extract will reduce the swollen and hyperemic mucous membrane; the anterior end of the middle turbinated bone may require removal, the frontal sinus may require to be opened and curetted. (And see below, SURGERY, Question 6.)

5. *Dysphagia* is painful or difficult swallowing.

Aphonia is loss of voice due to some peripheral lesion.

Dysphonia is an impairment of voice; or pain or difficulty in speaking.

JURISPRUDENCE AND TOXICOLOGY.

1. The post-mortem changes in death from freezing are not sufficiently characteristic to justify a positive opinion on the subject. But if the body were found putrefied, it would be evidence that death was not due to freezing, for intense cold hinders putrefaction. So, too, the posture of the body might afford some aid; if the body is found in a crouching posture, death was *probably* due to freezing, as that attitude is characteristic.

2. Let some of the stained material soak thoroughly in a very small quantity of saturated solution of sodium chloride. Put a few drops of the fluid on a slide, cover with a cover-glass, let evaporation occur, allow a drop of glacial acetic acid to enter from the side, and gently warm. On cooling, hæmin crystals form, and can be seen under the microscope.

3. To constitute a "live birth," there must be (1) complete extrusion of the child from its mother's body, and (2) some certain sign of life. The latter would be established by one or more of the following: pulsation of the cord, beating of the child's heart, motions of the limbs, twitchings of the muscles, wrinkling of the brows, puckering of the face, opening of the eyes, even if respiration does not take place. (From Witthaus and Becker's *Medical Jurisprudence*, etc.)

PRACTICE AND THERAPEUTICS.

1. In *strychnine poisoning* there is a history of taking strychnine; the symptoms develop rapidly; the spasms

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occur early; muscular symptoms commence in the extremities, and the muscles of the jaw become involved late, if at all; there is muscular relaxation between the convulsions.

In *tetanus* stiffness of the neck and muscles of the jaw with tonic spasm of the masseters soon develop; risus sardonius is present; the body is thrown into a condition of opisthotonos or emprosthotonos; the muscular rigidity is persistent; the paroxysms are very painful.

4. The early manifestations of pulmonary tuberculosis are: (1) *Physical signs*: Deficient chest expansion, the phtisical chest, slight dullness or impaired resonance over one apex, fine moist râles at end of inspiration, expiration prolonged or high pitched, breathing interrupted. (2) *Symptoms*: General weakness, lassitude, dyspnea on exertion, pallor, anorexia, loss of weight, slight fever, and night sweats, hemoptysis.

5. Two remedies to check the secretion of milk: belladonna, and potassium iodide.

7. *Organic murmurs* are due to stenosis or incompetency of one or more of the valves of the heart.

Functional murmurs are not due to valvular disease.

Organic murmurs may be systolic or diastolic; may be accompanied by marked dilatation or hypertrophy, and there will probably be a history of rheumatism or of some other disease capable of producing endocarditis. Whereas a murmur, usually systolic, soft, and blowing, heard best over the pulmonic area, associated with evidences of chlorosis or anemia, and affected by the position of the patient, is a *hemic* or *functional* murmur, and denotes as a rule an impoverished condition of the blood.

9. The patellar reflex is exaggerated in: hemiplegia, lateral sclerosis, general paresis, transverse myelitis, injuries to the spinal cord, hysteria, neurasthenia, tetanus, and strychnine poisoning.

PATHOLOGY.

1. Chills, malaise, fever, vomiting, and symptoms of general poisoning.

3. "Suppose a nerve is cut across, the piece of the nerve left in connection with the brain or spinal cord remains healthy both in structure and functions; but the peripheral piece of the nerve loses its functions and undergoes what is generally called after the discoverer of the process, *Wallerian degeneration*. A nerve is made up of nerve fibers, and each nerve fiber is essentially a branch of a nerve cell; when the nerve is cut the axis cylinders in the peripheral portion are separated from the cells of which they are branches and from which they have grown. These

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separated portions of the axis cylinders die, and the medullary sheath of each undergoes a gradual process of disintegration into droplets of myelin, which are ultimately absorbed and removed by the lymphatics. At the same time there is a multiplication of the nuclei of the primitive sheath. This degenerative process begins two or three days after the section has been made. In the case of the non-medullated fibers there is no medullary sheath to exhibit the disintegration changes just alluded to, and the nuclei of the sheath do not multiply; there is simply death of the axis cylinder. The degeneration occurs simultaneously throughout the whole extent of the nerve; it does not start from the section and travel to the periphery." (Kirkes' *Physiology*.)

4. The elimination of urea may be increased in: acute fevers and inflammations, diabetes, severe leukemia, paralysis agitans, pernicious anemia.

5. *Hyperinosis* means an excess of fibrin in the blood, *Hydremia* means an excess of the fluid constituents of the blood.

Melanemia means the presence of a black pigment in the blood.

Hemoglobinemia means the abnormal presence of hemoglobin in the plasma of the blood.

6. Active hyperemia may be caused by: stimulation of the vasomotor nerves, injury to the walls of the blood-vessels, sudden removal of support, the action of certain drugs.

7. See below, BACTERIOLOGY, Question I.

PHYSIOLOGY.

3. Color-blindness is the inability to distinguish clearly differences of color. Red and green are the colors usually indistinguishable by a person so affected.

4. The variation of body temperature, in health, is very slight; it is maintained between 98° and 99° F.

The normal temperature of the body is *maintained* by the thermotactic centres in the brain and cord keeping an equilibrium between the heat gained or produced in the body and the heat lost. Heat is *gained* to the body by (1) the muscles, during contraction; (2) the secreting glands; (3) the brain, during mental activity; and (4) by the ingestion of food and hot liquids.

Heat is *lost* to the body by (1) the skin, through evaporation, radiation, and conduction; (2) the lungs; and (3) the excretions (feces and urine).

5. The *causes* producing the *first* sound of the heart are not definitely ascertained; the following are supposed to be causatory factors: (1) The vibration and closure of

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the auriculo-ventricular valves, (2) the muscular sound produced by the contraction of the ventricles, and (3) the cardiac impulse against the chest wall.

The *second* sound is caused by the vibration due to the closure of the semilunar valves.

6. Stammering and stuttering are due to a want of co-ordination between the various groups of muscles concerned in the different actions that go to the make up of articulate speech. Imitation, adenoids, and fright are sometimes supposed to be contributing factors.

9.

DIGESTIVE SECRETION.	ACTIVE PRINCIPLE.	ACTION.
Saliva.....	Ptyalin.	Changes starches into dextrin and sugar.
Gastric juice.....	{ Pepsin.	Changes proteids into proteoses and peptones in an acid medium.
	{ A curdling ferment.	Curdles the casein of milk.
	{ Trypsin.	Changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; in an alkaline medium.
Pancreatic juice...	{ Amylopsin.	Converts starches into maltose.
	{ Steapsin.	Emulsifies and saponifies fats.
	{ A curdling ferment.	Curdles the casein of milk.

ANATOMY.

9. (1) The *pleural cavity*; in the sixth or seventh intercostal space, midway between the axillary lines; or in the eighth intercostal space, near the angle of the scapula.

(2) The *peritoneal cavity*; on the semilunar line, or on the linea alba.

(3) The *pericardial cavity*; in the fifth left intercostal space, one inch from the sternum; or in the sixth left intercostal space, immediately to the edge of the sternum.

(4) The *subarachnoid space of the spinal cord*; in the middle line, between the fourth and fifth lumbar vertebræ.

(5) *Joints*; and (6) the *tunica vaginalis of the testis*.

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10. Skin: fascia; muscles, biceps, coraco-brachialis, brachialis anticus, triceps; arteries, brachial, superior profunda, inferior profunda; veins, basilic, cephalic, brachial, superior profunda, inferior profunda; nerves, median, ulnar, musculo-spiral, internal cutaneous, musculo-cutaneous; bone, humerus.

OBSTETRICS.

9. By *involution* is meant the contraction and return of the uterus to its normal size after labor. It generally takes from six to eight weeks.

DISEASES OF WOMEN.

4. *Pruritus vulvæ* is a condition characterized by intense itching of the vulva and neighboring parts.

Pruritus vulvæ may be caused by:—parasites; diseases of the vulva, as inflammation, edema, vegetations, congestion, irritating discharges, lack of cleanliness, diabetic urine; it may also be of nervous origin, or idiopathic.

Treatment consists in removing the cause, if possible; cleanliness, fresh air, tonics, and general attention to hygiene; local applications of solution of bichloride of mercury, 1:2,000; or carbolic acid, 1:100; or lead and opium; dusting powders of bismuth subnitrate, calomel, or zinc oxide are also useful.

BACTERIOLOGY.

1. Immunity is the power of resistance of cells and tissues to the action of pathogenic bacteria.

(a) The conditions which give immunity from the pathogenic action of bacteria are:—(1) a previous attack of the disease; (2) inoculation, with small quantities of bacteria, so as to produce a mild attack of the disease; (3) vaccination; (4) the introduction of antitoxins; (5) the introduction of the toxins of the bacteria.

(b) Immunity can be destroyed by any condition which lowers the vitality of the tissues and thus causes lessened resistance to the action of the bacteria. Such are:—bad hygienic surroundings, exhaustion, exposure to cold, the action of poisons, diseases, injuries, etc.

2. Bouillon, gelatin, and blood serum.

3. The gonococcus stains with gentian-violet, and other basic aniline dyes; but it does not stain by the Gram method.

4. The cultural and microscopic points of difference between the *Bacillus coli communis* and the *Bacillus typhosus* (of Eberth) are:

"(1) The motility of the colon bacillus is, as a rule, not

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very pronounced, sometimes absent; that of the typhoid bacillus is usually very active.

"(2) On gelatine plates the colon bacillus develops more rapidly and luxuriantly than the typhoid bacillus, and on potato it grows more abundantly, being almost always visible.

"(3) The colon bacillus coagulates milk with acid reaction within twenty-four to forty-eight hours; the typhoid bacillus does not coagulate milk.

"(4) The colon bacillus causes fermentation with production of gas in media containing sugar; the typhoid bacillus does not.

"(5) In nutrient agar or gelatine containing lactose and litmus tincture and of a slightly alkaline reaction, the color of the colonies of colon bacillus is pink and the surrounding medium red; while the colonies of typhoid bacillus are blue and there is little or no reddening of the medium.

"(6) The colon bacillus produces indol in cultures of bouillon or peptone; the typhoid bacillus does not.

"(7) When a twenty-four-hour-old bouillon culture of the colon bacillus is mixed with the blood or serum of a patient suffering from genuine typhoid fever, in a dilution of one to ten or more, after the first week of the disease, the Widal reaction is negative; cultures of the typhoid bacillus treated in the same manner and examined in the hanging drop give the characteristic agglutination and clumping of the bacilli." (*Reference Handbook of the Medical Sciences.*)

5. The Widal serum reaction "depends upon the fact that serum from the blood of one ill with typhoid fever, mixed with a recent culture, will cause the typhoid bacilli to lose their motility and gather in groups, the whole called 'clumping.' Three drops of blood are taken from the well-washed aseptic finger tip or lobe of the ear, and each lies by itself on a sterile slide, passed through a flame and cooled just before use; this slide may be wrapped in cotton and transported for examination at the laboratory. Here one drop is mixed with a large drop of sterile water, to redissolve it. A drop from the summit of this is then mixed with six drops of fresh broth culture of the bacillus (not over twenty-four hours old) on a sterile slide. From this a small drop of mingled culture and blood is placed in the middle of a sterile cover-glass, and this is inverted over a sterile hollow-ground slide and examined. . . . A positive reaction is obtained when all the bacilli present gather in one or two masses or clumps, and cease their rapid movement inside of twenty minutes." (From Thayer's *Pathology.*)

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SURGERY.

2. Shock is the name given to a sudden and general depression of the vital powers due to some strong stimulation (such as injury or emotion) acting on the vital centers in the medulla, and producing vasomotor paralysis.

Treatment of shock:—place the patient in the recumbent position, with the head low, apply warmth to the body, administer a stimulant, and give a hot saline infusion; morphine, hypodermatically, may be necessary for the relief of pain.

Amputation may be done if it is necessary to save the patient's life, or if the damaged limb is adding to or prolonging the condition of shock. Some surgeons (*e.g.* Da Costa) think that it is never wise to amputate during shock; others (*e.g.* Roswell Park) oppose this view.

6. ABSCESS OF FRONTAL SINUS.—“The usual cause is an injury which may long antedate the symptoms. This injury causes or leads to blocking of the infundibulum; secretion accumulates and distends the sinus; and in some cases pus forms. In many cases the fluid slowly accumulates, and it requires years to produce marked symptoms. In other cases infection takes place, and the symptoms are positive and violent. If the outlet into the nose is not permanently blocked the fluid may discharge itself from time to time. In the chronic cases there is rarely much pain. The chief sign is a swelling of the inner or upper part of the orbit, which swelling progressively increases in size and displaces the eye. If at any time acute symptoms supervene, there will be pulsatile pain, discoloration, and tenderness.

“*Treatment:* In some cases it is possible to pass a trocar upward from the nose into the sinus, and so drain and irrigate. In most cases an incision should be made through the soft parts, and the sinus opened by a trephine or chisel. After the sinus has been opened it must be curetted, the opening into the meatus should be restored and enlarged, and a drainage tube is to be passed from the forehead incision into the nostril. Some surgeons open the sinus by making an osteoplastic flap.” (*Da Costa's Surgery.*)

Prognosis is generally good; some cases get well spontaneously, and most cases recover when the obstruction is removed and drainage is reestablished.

7. The lymphatic glands along Poupart's ligament are enlarged in syphilis; in malignant disease of the external genitals; in boils or other sources of irritation around the anus and perineum.

8. Osteomyelitis is an inflammation of the medullary canal of a bone, including both bone and marrow.

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Varieties: Simple acute osteomyelitis; acute infectious osteomyelitis; chronic osteomyelitis.

9. An aneurysm is a pulsating sac containing blood and communicating with the lumen of an artery.

Predisposing causes:—atheroma, syphilis, old age, arteritis, alcoholism, male sex.

Exciting causes:—increased blood pressure (which may be due to severe labor, sudden strains, violent exercise, chronic interstitial nephritis); injury to the artery, and embolus.

Usual locations:—Thoracic aorta, abdominal aorta, popliteal, femoral, carotid, subclavian, innominate, axillary, and iliac arteries.

STATE BOARD EXAMINATION QUESTIONS.

TENNESSEE STATE BOARD OF MEDICAL EXAMINERS.

MATERIA MEDICA.

1. Name two emetics, antipyretics (other than the coal-tar derivatives), antihelminthics, emmenagogues, diuretics, arterial sedatives, giving the dose of each, and the indications for the use of each.

2. What are antiseptics (internal)? Name two. Give the dose of each and the best mode of administering them.

3. What preparation of veratrum viride would you use? In what pathological lesions and in what dose would you administer?

4. Name one alkaloid each of cinchona, belladonna, jaborandi, hyoscyamus, opium, and hydrastis. Give the dose of each and indications for use.

5. What is the physiological action of podophyllin?

6. How would you prepare a normal salt solution and under what conditions would you use it?

7. How is Fowler's solution prepared?

8. How is the tincture of iodine prepared?

ANATOMY.

1. Name the muscles of the face and of the forearm.

2. Name the bones of the face and of the wrist.

3. Describe the external carotid artery, point of origin, and general course.

4. Describe the femoral artery. Give the point of origin and the important branches given off in its course.

5. Describe the diaphragm, its openings, the different organs in contact with or separated by it.

6. Describe the scrotum.

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7. Name the largest muscle in the human body. Give origin and insertion.

8. Name the ligaments of the shoulder and elbow joints.

CHEMISTRY.

1. (a) What is a urinometer? Of what does it consist? How graduated? (b) With what is urine compared? What is needed for an ordinary uranalysis? (c) If upon boiling urine you get a cloudy precipitate, how would you determine the nature of the precipitate?

2. (a) State methods of obtaining urinary sediments. (b) What is a centrifuge and how is it used?

3. Tell what you know about oxygen. (Do not write more than one page.)

4. The stomach of a person supposed to have been poisoned with arsenic is brought to you; give in detail your method of determining the presence or absence of that poison.

5. Give symptoms of strychnine poisoning and treatment of same. Differentiate its symptoms from those of other convulsive disorders. In case of death from strychnine poisoning, why is it more difficult to prove than arsenical poisoning?

6. Heat. (a) Define and explain expansion, conduction, and transmission. (b) What changes of state are produced by heat? (c) What is specific heat? (d) Give sources of heat.

7. State how, and the methods employed, and the source from which iodine is obtained. Common medicinal preparations used? How used? Doses and effects?

8. Define: (a) Static electricity. (b) Dynamic electricity. State uses of each. Define terms volt, ohm, and ampere.

SURGERY.

1. Define the terms "Science" and "Art" of surgery. What is aseptic surgery? What is antiseptic surgery? Illustrate the two latter.

2. Describe a Pott's fracture. How caused? Give treatment for (a) simple, (b) compound, (c) comminuted Pott's fracture. (d) Describe a Colles' fracture and give treatment. (e) What is a common result of almost any fracture of a long bone?

3. Diagnose fecal impaction from invagination of a gut, and give method of treating the first.

4. What is osteomyelitis? Diagnose. Give causation and treatment.

5. Give diagnosis and treatment of cancer of the breast.

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6. Define perineorrhaphy and trachelorrhaphy, and describe the operation for each.
7. Describe in detail a curettement of the uterus.
8. Define (a) prostatectomy, (b) cystotomy, (c) nephrectomy, (d) nephrotomy, (e) lithotomy. Give in detail your method of enucleating an eye.

PRACTICE.

1. Do you expect to have any puerperal fever in your practice? If you do, what will be the cause? Define puerperal fever, and give treatment.
2. Give symptoms, diagnosis, prognosis, and treatment of acute Bright's disease. Should you have uremic convulsions, what would be the cause, and how would you treat them?
3. What do you understand by gallstones? What is the technical name. Give diagnosis and treatment.
4. Give diagnosis and treatment of hereditary syphilis.
5. (a) Write a prescription for general debility, (b) one for an acute bronchial cough, (c) one for chronic constipation, (d) one for chronic diarrhea.
6. Define acute rheumatic fever. Give symptoms and treatment. What is the most frequent complication?
7. Give symptoms, diagnosis, prognosis and treatment of enterocolitis.
8. Give symptoms, prognosis, and treatment of purpura hæmorrhagica.

PATHOLOGY.

1. What is the meaning of active, and what of passive pathological changes?
2. What pathological changes take place in the kidneys during an attack of acute congestion?
3. What pathological changes take place in the kidneys during an attack of acute nephritis?
4. What pathological changes take place in the liver during an attack of acute catarrhal jaundice?
5. What pathological changes take place in catarrhal pneumonia?
6. Give pathology of diphtheria.
7. What pathological changes take place in the spleen during an attack of malarial fever?
8. What is the pathology of erysipelas?

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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

TENNESSEE STATE BOARD OF MEDICAL EXAMINERS.

MATERIA MEDICA.

1. *Two emetics*: Apomorphine hydrochloride, dose gr. 1-10 (hypodermically); Antimony and potassium tartrate, dose gr. j.

Two antipyretics: Quinine sulphate, dose gr. v.; Tincture of aconite, dose ℥x.

Two anthelmintics: Oleoresina Aspidii, dose gr. xxx.; Pelletierine taunate, dose gr. x.

Two emmenagogues: Pill of aloes and iron, dose 2 pills; Black oxide of Manganese, dose gr. ij.

Two diuretics: Infusion of Digitalis, dose ℥ij; Sparteine Sulphate, dose gr. ij.

Two arterial sedatives: Tincture of Aconite, dose ℥x; Tincture of Veratrum, dose ℥xv.

2. *Internal antiseptics* are drugs which, when swallowed or inhaled are supposed either to destroy or inhibit the growth of microorganisms.

Two internal antiseptics: Creosote, dose ℥iij; best administered in the form of an emulsion with codliver oil. Betanaphthol, dose gr. iv; best administered in keratin-coated pills if its action is desired on the intestines.

3. The preparation of veratrum viride to be used, is the tincture; dose ℥xv.

4.

	One alkaloid.	Dose.
Cinchona	Quinine	gr. iv (of the Sulphate)
Belladonna	Atropine	gr. 1/150 (of the Sulphate)
Jaborandi	Pilocarpine	gr. 1/5 (of the Hydrochloride)
Hyoscyamus	Hyoscyine	gr. 1/150 (of the Hydrobromide)
Opium	Morphine	gr. 1/4 (of the Sulphate)
Hydrastis	Hydrastine	gr. ss (of the Hydrochloride)

5. *The physiological action of podophyllin*: It is a gastrointestinal irritant; it has a drastic and cholagogue purgative action.

6. Normal salt solution is prepared by adding six drachms of sterilized sodium chloride to a liter of distilled water in a sterilized glass flask.

It is used to irrigate fresh wounds, to remove blood or foreign bodies, for cleansing mucous or serous surfaces; it also is used for intravenous injection when the circulation is failing; by hypodermoclysis it is used also

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when the circulation is rapidly failing, and after profuse hemorrhage, in cases of shock, septicemia, and uremia.

7. Fowler's solution is prepared by boiling ten grams of arsenic trioxide, twenty grams of potassium bicarbonate, and thirty grams of compound tincture of lavender in sufficient distilled water to make one liter.

8. Tincture of iodine is prepared by dissolving seventy grams of iodine and fifty grams of potassium iodide in alcohol enough to make one liter.

CHEMISTRY.

1. (a) A *Urinometer* is a form of hydrometer, used for determining the specific gravity of the urine.

It consists of a cylinder and a spindle.

The graduation on a urinometer is so constructed that the spindle sinks to the zero point when it is immersed in water at a given temperature. The denser the fluid into which the spindle is immersed, the higher it rises. The ordinary urinometer is graduated from 0 or 1,000 to 60 or 1,060.

(b) Urine is compared (for purposes of specific gravity) with distilled water at a certain temperature which is indicated for each instrument (generally 60° F.).

For an ordinary urinalysis, there are needed: A graduated cylinder in which to measure the quantity of urine; litmus paper; a "color scale"; urinometer; test-tubes, test-tube holder, test-tube stand; ureometer; albuminometer; burette; pipettes; glass funnel; beakers; filter papers; alcohol lamp; centrifuge; slides and cover slips; stains; microscope; nitric acid; Fehling's solution; hypobromite solution, for ureometer; acetic acid; sodium hydroxide solution, potassium hydroxide solution.

(c) The cloudy precipitate may be due to urates, phosphates, or albumin. If it is due to phosphates, it will clear upon the addition of a few drops of nitric acid; if it is due to urates, it will disappear on being heated.

2. (a) Urinary sediments may be obtained (1) by allowing the urine to stand; (2) by centrifuging.

(b) A centrifuge is an apparatus by means of which the solids in a fluid are separated by centrifugal force.

4. "The stomach should first be carefully examined as to its pathological condition, and also for the presence of solid particles of the poison. It should then be cut up into small fragments with scissors known to be perfectly clean, and, together with its contents, placed in a clean porcelain evaporating dish; distilled water added in sufficient quantity, together with about one-sixth the bulk of pure hydrochloric acid, and heated gently for about an hour, when most of the solid portions will have become

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disintegrated. After cooling, the mixture is thrown upon a muslin strainer and the solid matters washed several times with pure water and squeezed. The strainer and contents should be preserved for subsequent examination. The filtrate should be concentrated by evaporation over a water-bath and then filtered through paper." (Reese.)

After this, the Reinsch test can be applied, as follows: To the suspected fluid add a little pure HCl; suspend in the fluid a small strip of bright copper foil, and boil. If a deposit forms on the copper, remove the copper, wash it with pure water, dry on filter paper, but be careful not to rub off the deposit. Coil up the copper, and put it into a clean dry glass tube, open at both ends, and apply heat at the part where the copper is. If arsenic is present there will appear in the cold part of the tube a mirror, which will be found on microscopical examination to consist of octahedral crystals of arsenic trioxide.

5. The symptoms of strychnine poisoning are as follows: "Strychnine produces a sense of suffocation, thirst, tetanic spasms, usually opisthotonos, sometimes emprosthotonos, occasionally vomiting, contraction of the pupils during the spasms, and death, either by asphyxia during a paroxysm, or by exhaustion during a remission. The symptoms appear in from a few minutes to an hour after taking the poison, usually in less than twenty minutes; and death in from five minutes to six hours, usually within two hours.

Treatment: "The Convulsions are to be arrested or mitigated by bringing the patient under the influence of chloral or chloroform as rapidly as possible; the stomach is to be washed out, and the patient is to be kept as quiet as possible." (Witthaus' *Essentials of Chemistry*.)

Tetanus is the principal condition from which strychnine poisoning is to be differentiated. In tetanus, the onset is gradual, is apt to begin with trismus, swallowing is difficult or impossible, the condition is persistent, consciousness is dulled or lost, and there is history of a wound or injury. In strychnine poisoning, the onset is more sudden, the muscles of the jaw and neck are generally the last to be affected, there are marked remissions with muscular relaxation, consciousness is retained, and there is no history of a wound or injury.

Strychnine poisoning is more difficult to prove than arsenic poisoning, because in the latter the poison is not decomposed, and in spite of any chemical change the element arsenic remains, and may be demonstrated. This would not be possible in the case of strychnine.

6. (a) As a rule, all bodies expand when heated, and diminish in volume on losing heat.

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Conduction of heat is its transmission from one molecule to the neighboring molecule.

Transmission of heat may take place by conduction, convection, and radiation.

(b) By heat, substances can be converted from the solid state to the liquid state, and from the liquid to the gaseous state, as ice can be converted by heat to water, and then to steam.

(c) *Specific heat* is the amount of heat required to raise the temperature of a substance a given number of degrees.

(d) *Sources of heat*, are: The sun, the interior of the earth, friction, pressure, electricity, chemical action, combustion.

7. Iodine is obtained from sea-weed. Sea-weed is burnt, and the ashes (called kelp) are extracted with water and the solution is then evaporated. The mother liquor is then distilled with manganese dioxide and sulphuric acid, or the iodine is obtained by passing chlorine in, and heating.

The common medicinal preparations, with doses, are: Tincture of iodine, ℥ij; Lugol's solution, ℥ij; potassium iodide, gr. vii; sodium iodide, gr. vii; ammonium iodide, gr. iv.

8. (a) *Static electricity* is electricity at rest; and is usually produced by friction.

(b) *Dynamic electricity* is electricity in motion; it is also called current electricity.

A *volt* is that electromotive force, which, acting steadily through a conductor having a resistance of one ohm, will produce a current of one ampère.

An *ohm* is the amount of resistance shown by a column of mercury 106.3 centimeters long with a base of one millimeter square, at 0°C.

An *ampère* is such a current of electricity as would be given with an electromotive force of one volt through a wire with the resistance of one ohm.

SURGERY.

1. In *Aseptic Surgery* everything that is to come in contact with the wound is previously made free from germs, and all possibility of infecting the wound is avoided.

In *Antiseptic Surgery* antiseptic solutions are used to kill the bacteria that may be present or that may enter during the course of the operation.

2. *Pott's fracture* consists of a fracture of the lower end of the fibula, about three inches above the tip of the malleolus; and a fracture of the internal malleolus. The foot is twisted outward, the sole everted, and the heel drawn up; there is a depression at the site of the fracture, the inner malleolus either projects prominently or

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the fragment can be felt and crepitus elicited; the foot is shortened, and the ankle is swollen and widened.

Pott's fracture is usually caused by twisting the foot.

Colles' fracture is a fracture of the lower end of the radius; it is generally transverse, and is usually within an inch or an inch and a half of the articular surface. There is a characteristic deformity caused by the lower fragment and the carpus forming a prominence on the dorsal surface; at the same time there is a projection on the palmar surface just above the wrist, caused by the upper fragment. The hand is abducted and pronated, and the styloid process of the ulna becomes very prominent.

A common result of almost any fracture of a long bone, is shortening of the limb.

3. In *fecal impaction*, there is a history of long continued and increasing constipation, feeling of languor and depression, anorexia; the abdomen becomes distended gradually, and the symptoms develop slowly; pain comes on gradually, and later becomes continuous; there is usually a tumor in sigmoid flexure or cecum, it is doughy and firm; constipation is absolute.

In *invagination of the intestine*, there is a sudden onset, with severe pain which later tends to subside; rarely constipation, but often diarrhea may be present, accompanied with tenesmus; there is apt to be marked prostration or collapse; a movable tumor can often be felt in line of the colon, or in the rectum; in extreme case the invagination may protrude from the anus.

Method of treating fecal impaction: "The best means of relief are afforded by copious enemata of warm water administered in the knee-and-elbow position. Continuous irrigation by the siphon syringe is very efficacious, and, if employed for half an hour at a time, the hardest mass softens and gradually becomes disintegrated. The stream of water should be directed against the obstructing mass by means of a rectal tube. Before enemata are commenced it is often advisable to inject a few ounces of olive oil. Some physicians recommend copious injections of sweet oil with spirits of turpentine in the proportion of one drachm to the pint of oil. Metallic mercury has been strongly advocated. Occasionally, when low down, the fecal mass may be removed by scoop or spoon." (From *Reference Handbook of the Medical Sciences*.)

4. *Osteomyelitis* is inflammation of the bone and marrow; the term is often used now for inflammation of bone.

It is *caused* by infection, the bacteria gaining entrance either through a wound, or by extension from neighboring tissues, or they may be brought by the blood.

It is to be *diagnosed* from (1) *Rheumatism*, in which

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more than one joint is affected and the tenderness is *in* the joint and not *near* it. (2) *Tubercular arthritis*, in which the onset is slow, and the trouble starts in the epiphysis rather than in the diaphysis. (3) *Cellulitis*, in which the bone and periosteum are not affected, and in which there is always a wound.

In *osteomyelitis*, the *treatment* consists in relieving the constitutional symptoms, and preventing the bone from necrosing. An incision down to the bone is made; if pus is beneath the periosteum, the latter is also incised; a piece of bone is removed by chisel or trephine, pus is removed, the endosteum is hurt as little as possible, the wound is irrigated with hot bichloride solution, and packed with gauze; the soft parts are closed and the wound well drained. In case this fails, amputation may be necessary.

6. *Perineorrhaphy* is the operation of suturing a lacerated perineum.

Trachelorrhaphy is the operation of suturing a lacerated cervix uteri.

8. (a) *Prostatectomy* is the operation of removing the prostate gland, entirely or in part.

(b) *Cystotomy* is the operation of making an incision into the urinary bladder.

(c) *Nephrectomy* is the operation of removing a kidney.

(d) *Nephrotomy* is the operation of making an incision into the kidney.

(e) *Lithotomy* is the operation of removing a calculus by cutting into the urinary bladder.

Enucleation of the eyeball is performed as follows: "A general anesthetic is generally given. After introduction of the speculum, the conjunctiva is divided all around the cornea, as close to its border as possible, and dissected back as far as the insertions of the recti muscles. A squint hook is passed beneath the tendon of the internal rectus, and the latter is divided with the strabismus scissors close to its insertion; then the other straight muscles are cut in the same way, together with the subconjunctival connective tissue for some distance beyond the equator. The points of the scissors must always be directed toward the eyeball and the latter stripped as clean as possible to avoid any unnecessary removal of orbital tissue. Instead of commencing with a circumcorneal division of the conjunctiva, we may begin with a tenotomy of the internal rectus and then divide the conjunctiva as we pass from tendon to tendon. The hook is passed around the globe to make sure that the attachments of the muscles have been completely divided. The eyeball is then dislocated forward by pressing the speculum backward, and thus the optic nerve is put on the stretch. A

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pair of enucleation scissors, closed, are passed between sclera and conjunctiva, feeling for the optic nerve; they are withdrawn, slightly opened, and the nerve is divided close to the sclera. The eyeball is held between the thumb and index finger of the left hand, and the oblique muscles and other unsevered attachments are divided. The orbit is plugged for a few minutes to control hemorrhage, and the conjunctiva is usually closed with a single suture, which is passed through its edge at intervals and tied like the string of a pouch. The eye is bandaged and the patient kept in bed for a day." (May, *Diseases of the Eye*.)

PRACTICE.

1. I don't expect to have any puerperal fever in my practice, due to any want of care on my part.

The *causes of puerperal fever* are: Pathogenic bacteria which may be introduced into the woman in several ways, such as by the hands of the physician, nurse, midwife, or of the patient herself; by unclean instruments and catheters; by coitus during the time immediately preceding labor; by contact with secretions from wounds of any kind, no matter where situated; by general unhygienic surroundings, and contact with a patient suffering from scarlet fever or erysipelas on the part of any one attending on the woman. The percentage of such cases will depend on the care exercised by doctor, nurse, etc.; when infection does occur, it is generally streptococcic infection, either pure or mixed with other germs.

Puerperal Fever is a fever beginning within a week after labor, attended with acute inflammation of the reproductive organs, and with septic infection of the blood and general system.

3. *Gallstones* are calculi formed in or found in the gall-bladder or bile ducts.

The technical name is *Cholelithiasis*.

The *diagnosis* is made by (1) the intense and sudden pain, radiating from the right hypochondriac region to the right shoulder. (2) Cold sweat, feeble pulse, vomiting, and collapse may be present. (3) Chill and fever are present at the onset. (4) The calculus may be found in the feces.

Treatment. Prophylaxis includes: Plain and easily digested food, the ingestion of plenty of good drinking water between meals, sufficient outdoor exercise, salines, and the avoidance of indigestion.

During an attack: Inhalation of chloroform, a hypo-

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dermic of morphine (gr. 1/4) and atropine (gr. 1/120), application of heat, and diffusible stimulants if shock is present.

Cholecystotomy may be performed, and the stones removed.

5. (a) For *General Debility*:

℞. Strychninæ sulphatis, gr. j.
Quininæ sulphatis, ℥j.
Tincturæ ferri chloridi, ℥iij.
Acidi phosphorici diluti, ℥v.
Glycerini q.s. ad ℥v. Misce.

Signa: One teaspoonful after each meal.

(b) For *Acute Bronchial Cough*:

℞. Ammonii carbonatis, gr. xxxij.
Fl. extr. senegæ.
Fl. extr. scillæ, āā ℥j.
Tincturæ opii camphoratæ, ℥vj.
Aquæ destillatæ, ℥iv.
Syrupi Tolutani q.s. ad ℥iv. Misce.

Signa: One teaspoonful every three hours.

(c) For *Chronic Constipation*:

℞. Fl. extr. cascariæ sagradæ, ℥ss.
Tincturæ nucis vomicæ, ℥v.
Tincturæ belladonnæ, ℥ij.
Glycerini q.s. ad ℥ij. Misce.

Signa: One teaspoonful three times a day.

(d) For *Chronic Diarrhea*:

℞. Morphinæ sulphatis, gr. j.
Bismuthi subnitratæ, ℥j. Misce.
Et fiat in chart. no. xij.

Signa: Take one powder three or four times a day.

PATHOLOGY.

1. By *active pathological change* is understood that condition in which formation exceeds waste, and growth results. Examples: Hypertrophy, Tumor-formation, Regeneration.

By *passive pathological change*, is understood that condition in which morbid processes are attended by arrest or impairment of nutrition. Examples: Atrophy, Degenerations, Infiltrations, Necrosis.

7. In malaria, the spleen is much enlarged, and is of a brownish color, with areas of deep pigmentation; the capsule is thickened.

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STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS FOR THE STATE OF TEXAS.

(The applicant will answer ten questions of his own selection in each of the following papers.)

ANATOMY.

1. Describe a dorsal vertebra.
2. Give origin, insertion, and action of the pectoralis major muscle.
3. Name the nerves that supply the tongue and give their function.
4. Give the relations of the radial artery, and name its branches.
5. Describe the spleen.
6. Name the points of special interest of the popliteal space.
7. Name the ligaments which suspend the uterus.
8. What area is drained by the right lymphatic duct?
9. Describe the elbow joints.
10. Describe the artificial divisions of the abdomen, and name the contents of each subdivision.
11. Describe the great sciatic nerve.
12. Describe the rectum.

PHYSIOLOGY.

1. Explain what is meant by "blood pressure" and "peripheral resistance."
2. At what point in the circulatory system does the blood flow most rapidly?
3. Which travels with greater rapidity, the pulse or the blood stream?
4. In what organ is lymph most rapidly formed?
5. How is digestion modified by the absence of hydrochloric acid from the gastric juice?
6. To what kind of diet is the addition of sodium chloride of most importance?
7. What are the limitations to the use of milk as the sole article of diet?
8. What is meant by "internal secretion"?
9. What is the chief source of urea?
10. What are the functions of the red blood corpuscles?
11. Why does the injection of a large quantity of normal saline solution into the vessels cause diuresis?
12. What are the functions of the pancreatic juice?

CHEMISTRY.

1. Define molecular weight.
2. Define potable, hard, and temporary hard water.

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3. How is H_2S prepared? Write formula.
4. Describe the bismuth test for sugar in the urine.
What is the objection to this test?
5. Mention chemical and physical properties of arsenic.
6. Upon what reaction does the copper test for sugar in the urine depend?
7. What do you understand by diffusion of gases?
8. What is the chemical antidote for bichloride of mercury?
9. What are the chemical incompatibilities of iron and antipyrine?
10. What are fats, what are soaps?
11. Give atomic weight and valence of hydrogen, lead, sulphur, and mercury.
12. What is the relation between albumin and the specific gravity, and sugar and the specific gravity of the urine?

HISTOLOGY.

1. To what part of the anatomy does histology apply?
2. What relation does a knowledge of histology bear to physiology?
3. Describe in a brief way the histology of the kidney
4. Give the minute anatomy of the liver.
5. Name the minute endings of the bronchi.
6. What are Haversian canals and where found?
7. Mention the communication between the great system of blood-vessels.
8. Mention the three great groups into which the tissues of the body are divided.
9. What are the principal forms of fibrous tissue?
10. Mention principal difference between cartilage and bone.
11. What structures compose secreting glands?
12. What are lymphatic glands, and where are they found?

PATHOLOGY.

1. Describe in a brief way the pathology of yellow fever.
2. In what part of the system would you expect to find primarily the infectious element in yellow fever?
3. From results of recent investigations, what, in your opinion, is the infectious element in yellow fever, and how is it conveyed?
4. What other infectious disease, common in the country, the morbid appearances of which sometimes so much resemble those of yellow fever?

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5. What, in your opinion, is the source of infection in malarial diseases?

6. In malarial cachexia, or chronic malarial poisoning, what morbid conditions are usually found?

7. A case—age 26. Recurring hematemesis, profuse—enormously enlarged spleen. Anemia—lemon-tinted skin—moderate general dropsy. Sclera bluish white; digestion poor, with inclination to costiveness. History: Two or three terms of chills in boyhood, each lasting one year or more. Diagnosis made without microscope. Gave him quinine in acid solution for six or eight weeks—nearly 400 grains in all. Spleen reduced like magic to almost normal size, no more hemorrhage, dropsy disappeared, skin resumed more natural tint, when he passed from under my care. What, in your opinion, was the morbidity causing the hemorrhage; and what caused this morbidity?

8. Where would you expect to find pathological lesions in hydrophobia, and mention some of the most pronounced.

9. What pathological lesions to be found in simple acute endocarditis?

10. How does endocarditis differ from acute plastic pericarditis pathologically?

11. Which of these will likely affect most seriously the circulation of the blood, and why?

12. Mention some disease which is most commonly the cause of either or both of these morbid conditions.

PRACTICE.

1. What is intestinal obstruction and its pathological anatomy?

2. In acute indigestion resulting in cholera morbus, what would be your first plan of treatment?

3. What are biliary calculi, their cause and treatment?

4. How would you diagnose and treat a case of gastric cancer?

5. What is sciatica, symptoms, and treatment?

6. What are the symptoms and treatment of acute catarrhal laryngitis?

7. How would you diagnose and treat a case of diphtheria?

8. What are the methods employed in making an examination of the heart? Describe the same in normal condition.

9. What is epilepsy, its cause, and varieties?

10. What is interstitial nephritis?

11. What is anemia, its causes, and pathological anatomy?

12. How would you diagnose a case of croupous pneumonia?

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SURGERY.

1. Give the principal methods of abdominal drainage with which you are familiar. What method do you consider best?
2. How would you treat a case of ingrown toe-nail?
3. Mention the most important symptoms of an acute synovitis involving the hip-joint.
4. Give your treatment of a large varicose ulcer of the leg.
5. What are the principal signs of a simple fracture involving the femur?
6. What important tissues may be accidentally wounded during an operation for femoral hernia?
7. What are the symptoms of acute intestinal obstruction?
8. How should an aneurysm of the femoral artery be treated?
9. How would you treat a large varicocele?
10. Describe in detail how you would correct the deformity and dress a case of Colles' fracture.
11. Describe in detail how you would proceed to control hemorrhage during an amputation of the hip-joint.
12. How would you treat a carbuncle?

EYE, EAR, NOSE, AND THROAT.

(Four questions to be answered.)

1. What are the dangers of otitis media?
2. How would you make a differential diagnosis between a case of diphtheria and a bad case of follicular tonsillitis?
3. Upon what would you base a diagnosis of suppurating disease in the antrum of Highmore?
4. Describe in detail how you would proceed to remove a small foreign body embedded in the cornea.
5. Upon what symptoms would you make a diagnosis of mastoiditis?

OBSTETRICS.

1. (a) What is the connection between ovulation and menstruation? (b) What is the average duration of menstruation? (c) What is the interval between the menstrual periods? (d) Give the average age at which menstruation first occurs.
2. Describe the axis of the inlet and the outlet of the pelvis and the axis of the cavity.
3. How are the organs of generation divided, external and internal?

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4. Describe the changes which occur in the ovum after impregnation.
5. (a) What are the uses of the liquor amnii during pregnancy? (b) During labor?
6. (a) What is puberty? (b) Describe the changes that take place in the female at puberty.
7. (a) What comprises the puerperal state? (b) Describe the maternal changes during that period.
8. Describe the lochia and the conditions that change its composition and quantity.
9. Give the diagnosis and treatment of trunk presentations.
10. In what way may delivery be arrested in twin births? Describe the management of the same.
11. Give the causes, diagnosis, and treatment of purulent ophthalmia neonatorum.
12. Give causes, pathology, and treatment of thrush.

HYGIENE.

1. What is the difference between a contagious and an infectious disease?
2. Describe two of the best methods of fumigation to prevent the spread of contagious diseases.
3. What steps are essential to prevent the spread of typhoid fever from a patient to other members of the household?
4. Describe a good plan for ventilating a sleeping-room in a temperate climate during winter.
5. What are the normal constituents of atmospheric air?
6. What are the deleterious ingredients of exhaled air?
7. What is meant by absolute and relative humidity?
8. What symptoms are produced in some persons by sudden changes from low to high altitudes?
9. Why should the principles of hygiene be observed in construction of dwellings?
10. In the selection of a building site, what things are to be sought and what avoided?
11. How would you guard against the bowel disturbances of infants during their first and second summers?
12. From what foods does ptomain poisoning arise?

MEDICAL JURISPRUDENCE.

1. Define forensic medicine.
2. Briefly enumerate the difference between an ordinary and a medical expert witness.
3. Enumerate the general rules to be observed in testifying as an expert witness.

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4. Define criminal and civil malpractice.
5. Briefly enumerate what you would do if called to view the body of a person found dead.
6. What do you understand by personal identity?
7. Give a practical and reliable test for human blood.
8. State what is considered a live birth by law and what manifestations of life would establish it medico-legally.
9. If called to see a person before death suspected of having been poisoned, state what steps you would take to determine this fact both before and after death.
10. What do you understand by a dying declaration, and what is its value in court?
11. Give a differential diagnosis between opium poisoning, acute alcoholism, and apoplexy.
12. If called to view a person found dead from gunshot wound, state how you would determine as to whether it was probably suicide or murder.

ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

BOARD OF MEDICAL EXAMINERS FOR THE STATE OF TEXAS.

PHYSIOLOGY.

1. *Blood pressure* is the pressure on the blood due to the ventricular systole, the elasticity of the walls of the arteries, and the resistance in the capillaries. This latter is called *peripheral resistance*.
2. At the beginning of the aorta.
3. The pulse travels at the rate of about fifteen to thirty feet per second in the arteries; the blood stream travels at the rate of about one foot per second in the arteries.
4. There are two theories as to the formation of lymph:—(1) That it is formed from the blood plasma by the processes of filtration, diffusion, and osmosis. (2) That in addition to these, the endothelial cells of the capillaries exercise some influence.
5. Proteid digestion may be slightly delayed.
6. Vegetable foods.
7. During the earliest months of life milk is a perfect food. Later on it will not suffice, as it contains too little iron; further, tremendous quantities of it would have to be ingested in order to ensure an adequate supply of carbon and nitrogen.
8. It is generally held now that the glandular organs, chiefly the pancreas, liver, and the ductless glands, produce

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a secretion, peculiar in each case to the particular gland producing it, and which is supposed to be given off to the blood or lymph, and to have some peculiar value in the general metabolism of the body. Such secretions are called internal secretions, in contradistinction to the previously known secretions, which are carried off by a duct, and are known as external secretions. Very little is definitely known of these internal secretions, but much work is being done on the subject.

9. Urea is produced from the proteids of the food and tissues. It is chiefly formed in the liver.

10. To carry oxygen from the lungs to the tissues.

11. The normal salt solution abstracts water from the tissues of the body and causes a condition of hydremic plethora; the capillaries of the kidneys thus contain a greater quantity of blood, and capillary pressure is increased. The result is:—(1) more rapid filtration, and (2) an increased amount of urine.

12. (1) It changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; (2) it converts starch into maltose; (3) it emulsifies and saponifies fats; and (4) it causes milk to curdle.

CHEMISTRY.

1. Molecular weight is the weight of a molecule of a substance as compared with the weight of an atom of hydrogen. It may also be said to be the sum of the weights of the atoms composing its molecule.

2. A *potable* water is one that is apparently fit to drink. A *hard* water is one that forms a curdy deposit with soap. In a *temporary hard* water the hardness is due to the bicarbonates of magnesium and calcium, and can be removed by boiling and filtering.

3. H_2S may be prepared by treating ferrous sulphide with dilute sulphuric acid. Thus:— $\text{FeS} + \text{H}_2\text{SO}_4 = \text{FeSO}_4 + \text{H}_2\text{S}$.

4. Albumin, if present, must be removed. Add to the urine enough Na_2CO_3 to render it strongly alkaline. Put about three cubic centimeters of the urine into a test tube, add a very small quantity of powdered bismuth subnitrate, and boil. If sugar is present the bismuth powder becomes black. The test is not reliable, for other substances than sugar will produce the reaction.

5. Arsenic is a brittle gray solid with a metallic lustre, or a black amorphous powder. It is insoluble in water, and is either odorless or has the odor of garlic. It is tarnished by moisture; in dry air it is not altered; heated in air it becomes arsenic trioxide. It combines with most metals.

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also with chlorine, bromine, iodine, sulphur, and with nascent hydrogen.

6. The boiling alkaline solution converts glucose into substances which are very easily oxidized, and are therefore good reducing agents. If cupric sulphate is present it is converted into cuprous sulphate, which latter is decomposed and cuprous oxide is deposited.

7. When two gases are placed side by side, or are separated from each other by a porous substance, the gases will pass into one another, and a homogeneous mixture is the result.

8. White of egg, in moderation, and followed by an emetic.

9. The chief incompatibles of *Iron* are: acids, acid salts, vegetable astringents, alkalies, and their carbonates. Of *Antipyrine*: nitrous compounds, ferric salts (in solution), nitrites (in solution), chloral hydrate, tincture of iodine, mercuric chloride, and tinctures containing iron or tannin.

10. *Fats* are mixtures of the glycerol esters of stearic, palmitic, and oleic acids. Soaps are the sodium or potassium salts of stearic, palmitic, and oleic acids.

11. Hydrogen: atomic weight, 1; valence, 1. Lead: atomic weight, 207; valence, 2 or 4. Sulphur: atomic weight, 32; valence, 2 or 6. Mercury: atomic weight, 200; valence, 2.

12. (1) The presence of *Albumin* may have no material effect upon the specific gravity of the urine, but (2) a specific gravity lower than normal has been held to denote the presence of albumin. *Sugar* in the urine causes a higher specific gravity.

HISTOLOGY.

1. Microscopically, to all parts.

2. *Histology* treats of the minute or microscopical structure of the various tissues and organs of the body; *physiology* is concerned with the functions of the same. Hence, a knowledge of the former is supposed to be an aid to the proper understanding of the latter.

5. The alveoli.

7. The capillaries.

8. Epiblastic, mesoblastic, and hypoblastic.

9. White fibrous, yellow elastic fibrous, mixed fibrous, mucous, and retiform; areolar and adipose tissues also contain some fibrous tissue.

10. Bone tissue is impregnated with lime salts.

11. A basement membrane, epithelial cells, vascular tissue with lymphatics, nerves, and capillaries, secreting cells which are capable of elaborating the elements proper to the particular secretion.

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PATHOLOGY.

1. Rigor mortis is well marked, and appears early; the muscles are dark and dry; the skin is yellow or very dark, yellow green; subserous hemorrhages are found in the lungs and heart, and the blood may be thin and fluid. The gastric mucosa is strongly congested and swollen, and hemorrhages into the membrane and in the cavity are common; the blood is dark and thick; in the upper part of the small intestine similar lesions may be found, and in the colon there may be dysenteric necrosis. The liver is swollen, or moderately decreased, soft, and of a color varying from dark red to light yellow, with bile staining; the gall-bladder contains a small amount of dark, thick bile. The spleen may be small. The kidneys show acute nephritis, often hemorrhagic. (Thayer's Pathology.)

2. In the blood.

3. Probably *Bacillus icteroides* of Sanarelli. It is conveyed by the *Stegomyia fasciata* mosquito.

4. Severe bilious or remittent malarial fever.

5. The *plasmodium* or *hematozoon malariae*, conveyed by the *anopheles* mosquito.

6. Secondary anemia; diminished number of white blood corpuscles; spleen enlarged, hard and pigmented; liver enlarged; kidneys pigmented; skin, dirty yellow color, and sometimes paraplegia and orchitis may be present.

7. Chronic malarial poisoning or malarial cachexia. Caused by the *plasmodium malariae*.

8. The upper part of the spinal cord, pons, medulla, and cortex of the cerebrum. Hemorrhages, and dilated and congested blood-vessels.

9. Vegetations occur on the valves or on the lining membrane of the cavities of the heart. These vegetations consist, at first, of fibrin and leucocytes, later of connective tissue. Microorganisms are also generally present.

11. The endocarditis; because the vegetations present may become broken off and carried by the circulation to distant parts of the body, thus causing embolism or infarction.

12. Both of these diseases may be caused by acute articular rheumatism.

PRACTICE.

2. Remove any irritant or offending matter; give calomel in fractional doses, and, to allay the pain, a hypodermic of morphine (grain $\frac{1}{4}$) and atropine (grain 1-120).

3. The predisposing causes are: age, sedentary habits, and obstruction of the bile ducts. The exciting cause is microbic infection of the gall-bladder. The treatment during an attack: inhalation of chloroform, a hypodermic of

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morphine and atropine (as in question 2 above), application of heat, and diffusible stimulants if shock is present. Prophylaxis includes: plain and easily digested food, the ingestion of plenty of good drinking water between meals, sufficient outdoor exercise, salines, and the avoidance of indigestion.

7. For diagnosis, see below, *Eye, Ear, Nose, and Throat*, question 2.

SURGERY.

1. Gauze; rubber tubing; glass tubing; strands of gut, or horsehair, or silk. There is no one method that is universally best. For blood or serum, capillary drainage along a strip of gauze is best; for pus, the tubes are better employed.

3. Pain; limited movement of the joint; the limb is flexed, abducted, and everted; there may be tenderness and fullness in Scarpa's triangle and in the gluteal region; the muscles controlling the movements of the joint may undergo tonic contraction or become atrophied.

6. The obturator artery, if abnormal; the deep epigastric artery; the spermatic cord, in the male; the round ligament in the female. This latter is not of much consequence, but, if the spermatic cord is cut, the vas deferens and spermatic artery are also severed.

8. It may be treated by (1) extirpation, or (2) ligature of the common femoral or superficial femoral artery, or (3) by compression in the groin.

EYE, EAR, NOSE, AND THROAT.

1. Deafness or impairment of hearing; necrosis of the ossicles; caries or necrosis of the temporal bone; polypi; inflammation of the mastoid cells and antrum; cholesteatoma; facial paralysis; subcranial abscess; cerebral compression; meningitis; thrombosis of the lateral sinus; abscess in the cerebrum or cerebellum; death.

2. In *diphtheria* the onset is more gradual; the temperature rises to about 101° to 103° F.; the tonsils are not much enlarged; there is an exudate of a thick grayish membrane which is very adherent, is removed only with difficulty, and leaves a bleeding surface; this membrane soon re-forms and may be found on the fauces and pharynx as well as on the tonsils; in the exudate the Klebs-Löffler bacilli may be found.

In *follicular tonsillitis* the onset is more sudden; the temperature may be a little higher than that of diphtheria; there is no membrane, but the tonsils are red and swollen, and in the crypts are seen white cheesy spots or plugs, which consist of broken-down epithelium, and are easily brushed away; Klebs-Löffler bacilli are never found.

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3. Pain; a periodic purulent discharge from the nose; the presence of pus on puncturing the antrum; and, sometimes, transillumination will be of service.

4. "The eye is cocaineized; the patient is seated facing a good light, with the surgeon standing behind and supporting the head; the lids are separated and the eyeball is steadied by the fingers of the left hand, the index finger is applied to the margin of the upper lid, and the middle finger to the lower lid, and the two fingers are separated, at the same time gently pressing backward. The instruments used are either the blunt spud, the gouge, or the foreign-body needle. When the foreign body is superficial, the blunt spud will answer. When it has penetrated into the corneal substance, it must be picked or dug out with the gouge, or the needle; in such cases, the instrument is passed behind the foreign body. The wound which results must be kept clean by frequent irrigation with solution of boric acid; frequently a protective bandage is indicated. If a ring of rust is present, this also should be removed. Care must be taken to inflict as little injury as possible, and when the foreign body is deep, not to perforate the cornea." (From May's "Diseases of the Eye.")

5. Intense pain of a boring character in the ear or mastoid process; a depression and tumefaction of the postero-superior wall of the auditory canal; great tenderness on pressure over the mastoid region; swelling, redness, and edema over the mastoid process.

OBSTETRICS.

1. (a) The connection between ovulation and menstruation is not yet definitely settled, but the two functions seem to be closely associated. It has been held that ovulation is dependent upon menstruation; also that menstruation is dependent upon ovulation; it has also been proved that each may occur without the other, and it is possible that they are both dependent upon some common (and as yet unknown) cause.

(b) About three or four days.

(c) About twenty-eight days, from the beginning of one period to the beginning of the next.

(d) In this country, about fourteen years; in warmer climates it occurs earlier.

5. (a) (1) As a protection to the fetus against pressure and shocks from without. (2) As a protection to the uterus from excessive fetal movements. (3) It distends the uterus, and thus allows for the growth and movements of the fetus. (4) It receives the excretions of the fetus. (5) It surrounds the fetus with a medium of equable temperature, and serves to prevent loss of heat. (6) It pre-

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vents the formation of adhesions between the fetus and the walls of the amniotic sac. (7) It has been supposed, by some, to afford some slight nutrition to the fetus.

(b) It acts as a fluid wedge, and dilates the os uteri and the cervix; it also slightly lubricates the parts.

HYGIENE.

1. An *infectious* disease is one that is caused by bacteria. A *contagious* disease is one that can be communicated to a healthy person by contact with one who is infected.

5. Oxygen, nitrogen, carbon dioxide, water vapor, argon, ammoniacal compounds, hydrocarbons, ozone, oxides of nitrogen, and solid particles.

6. Carbon dioxide, crowd poison, organic matter given off from the skin and lungs, fatty acids, and pathogenic bacteria.

7. *Absolute humidity* is the amount of watery vapor contained in the atmosphere, irrespective of the temperature. *Relative humidity* is the proportion of watery vapor in the atmosphere at a certain temperature, as compared with air completely saturated (which is expressed by 100).

8. Any of the following: giddiness, dyspnea, palpitation of the heart, headache, gasping for breath, dryness of the throat, intense thirst, general malaise, fatigue, loss of appetite, nausea, vomiting, tinnitus aurium, slight elevation of body temperature, and occasionally epistaxis, bleeding from the gums, bloodshot eyes, and hemoptysis.

MEDICAL JURISPRUDENCE.

1. Forensic Medicine has been defined as the application of medical, surgical, or obstetrical knowledge to the purposes of legal trials.

2. The ordinary witness testifies only to *facts*. An expert witness, in addition, gives his *opinion* on facts or supposed facts as noted by himself or asserted by others.

3. The following, which admirably answers this question, is from Witthaus and Becker's "Medical Jurisprudence":

(1) A physician should refuse to testify as an expert unless he is conscious that he is really qualified as an expert.

(2) After accepting the responsibility, his first duty should be to make a diligent examination and preparation for his testimony, unless it be upon a subject with which he is familiar, and which he is satisfied that he has already exhausted, by reading the best authorities that he can find, and by careful reflection upon particular questions as to which his opinion will be asked.

(3) Where he is to make an examination of facts, such

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as the post-mortem examination of a body, a chemical analysis, or an examination of an alleged insane person, he should insist upon having plenty of time and full opportunity for doing his work thoroughly. He should take particular pains to make his examination open and fair, and, if possible, should invite opposing experts to cooperate with him in it.

(4) He should be honest with his client before the trial in advising him and giving him opinions, and upon the trial should observe an absolutely impartial attitude, concealing nothing, perverting nothing, exaggerating nothing.

(5) On the preliminary examination as to his qualifications as a witness, he should be frank and open in answering questions. He should state fully the extent and the limits of his personal experience and of his reading upon the subject, without shrinking from responsibility, yet without self-glorification.

(6) He should be simple, plain, and clear in his statement of scientific facts and principles, avoiding the use of technical language, and trying to put his ideas in such form that they will be grasped and comprehended by men of ordinary education and intelligence.

(7) He should avoid stating any conclusions or principles of which he is not certain, but having an assurance that he is right he should be firm and positive. He should admit the limitations of his knowledge and ability. Where a question is asked that he cannot answer, he should not hesitate to say so, but he should refuse to be led outside the subject of inquiry, and should confine his testimony to those scientific questions which are really involved in the case, or in his examination of the case.

(8) He should always bear in mind that at the close of his testimony an opportunity is usually given to him to explain anything which he may be conscious of having said which requires explanation, and partial statements which need a qualification to make them a truth. This is the physician's opportunity to set himself right with the court and with the jury. If the course of the examination has been unsatisfactory to him, he can then, by a brief and plain statement of the general points which he has intended to convey by his testimony, sweep away all the confusion and uncertainty arising from the long examination and cross-examination, and can often succeed in producing for the first time the impression which he desires to produce, and can present the scientific aspects of the case briefly and correctly.

8. To constitute a "live birth," there must be (1) complete extrusion of the child from its mother's body, and (2) some certain sign of life. The latter would be established

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by one or more of the following: pulsation of the cord, beating of the child's heart, motions of the limbs, twitchings of the muscles, wrinkling of the brows, puckering of the face, opening of the eyes, even if respiration does not take place. (From Witthaus and Becker's "Medical Jurisprudence, etc.")

10. By a "dying declaration" is understood any statement made by a dying person who believes that he cannot recover, and that he is, at that very time, in actual danger of death. The statement need not be sworn to; it should be voluntary and sincere, and it is admissible as evidence in a court if the individual making it dies.

STATE BOARD EXAMINATION QUESTIONS.

VERMONT STATE BOARD OF MEDICAL REGISTRATION.

ANATOMY.

1. Describe the bony pelvis, and state what bounds the cavity of the true pelvis above.
2. How is Poupart's ligament formed? What purpose does it serve?
3. Name the muscles of the abdomen, and give the origin, insertion, and action of any one of them.
4. What structures pass through the foramen magnum?
5. Give the relative position, from without inward, of the structures contained in Scarpa's triangle.
6. Give the origin, course, distribution, and function of the second pair of cranial nerves.
7. Name and bound the ventricles of the brain.
8. Describe the pleural membrane and give its relations.
9. Describe the male urethra.
10. What structures are inclosed within the broad ligaments of the uterus?

BACTERIOLOGY.

1. Describe the two most common pyogenic bacteria, and name the bacteria found in erysipelas, cellulitis, and pyemia.
2. What bacteria are liable to be mistaken for the tubercle bacillus, and how may this error be avoided?
3. Describe ptomaines, and name three sources of ptomain poisoning.
4. Give a detailed description of Widal's test in typhoid fever.
5. Write twenty lines upon serum therapy and name diseases in which it has been successfully employed.

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PHYSIOLOGY.

1. How are cells reproduced?
2. What are the functions of epithelium?
3. How is cartilage nourished?
4. What are the differences between arterial and venous blood?
5. What physiological process takes place in the capillaries?
6. Give the function of the epiglottis?
7. What are enzymes?
8. How would digestion be affected were the ductus communis choledochus obstructed?
9. Give the physiology of urine excretion.
10. What are the functions of the brain membranes?

HYGIENE.

1. Name the impurities in water that may cause diarrhea.
2. What hygienic precautions should be taken in treating a case of tuberculosis?
3. Give the best method of frying meat and fish, and the reason for your opinion.
4. Tell how to make a beef tea that will be nutritious.
5. Mention and describe the diseases of animals that are communicable to man, and state the means that should be employed for the prevention of these diseases in man.

PRACTICE.

1. Discuss the prophylactic treatment of typhoid fever.
2. Mention the different types of diphtheria and give treatment.
3. Give prognosis in pulmonary tuberculosis.
4. What is the symptomatology of leprosy?
5. How would you treat a case of gonorrheal arthritis?
6. What course may gallstones pursue?
7. Write a short article on Addison's Disease.
8. Name the valvular heart lesions in the order of their frequency of occurrence.
9. How would you manage a case of diabetes mellitus?
10. What may vertigo indicate?

PATHOLOGY.

1. Describe the blood picture in pernicious anemia.
2. What are the microscopical findings in locomotor ataxia?
3. Compare the kidneys microscopically in chronic parenchymatous and chronic interstitial nephritis.
4. Give the morbid anatomy of diphtheria.

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5. What are the pathological changes occurring in diabetes mellitus?

SURGERY.

1. How is suppuration developed?
2. Give causes, symptoms, and treatment of osteomyelitis.
3. Name the varieties of ulcer.
4. Name the varieties and general symptoms of fracture.
5. How would you reduce a dislocation of the hip?
6. Give the indications for tracheotomy and how performed.
7. Give symptoms of vesical calculus.
8. Give symptoms and treatment of synovitis.
9. Give causes, symptoms, and treatment of phlebitis.
10. Describe in detail an operation for hemorrhoids.

LEGAL MEDICINE.

1. Give a medical definition of insanity.
2. What is atelectasis? Its effect on the newborn?
3. Of what use is medical examination in life insurance?
4. What constitutes rape? Give medical evidence.
5. Give medical evidence that a child was born at term.

CHEMISTRY.

1. Define elementary and compound matter.
2. What do groups of atoms represent? What is their chemical notation termed?
3. What are normal, acid, basic, and double salts? When one molecule each of hydrogen and chlorine unite, what is formed?
4. State composition, formation and properties of ammonia. How are nitrates formed in nature?
5. What are the properties of urea? Why do urates form deposits in joints and cartilages?

MATERIA MEDICA AND THERAPEUTICS.

1. Give preparations, alkaloids, and physiological action of nux vomica.
2. In what diseases would you prescribe arsenic? Name three preparations of same with dose of each.
3. Name a drug useful as a vasodilator and vasoconstrictor. Give indications for same.
4. Give the dose of apomorphia—give the therapeutic uses for same.
5. Write an Rx for the following: Lithemia, dysuria, chorea.

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6. Mention the incompatibles of digitalis. When, in your opinion, is digitalis contraindicated?
7. Name three preparations of the following drugs and indications for their use; glycyrrhiza, cinchona, camphora.
8. Give child (1 year) and adult dose of acetanilid, morphine, hyoscin.
9. For what conditions would you prescribe the following: Cantharides, capsicum, belladonna, strophanthus?
10. What are the therapeutic uses of the mineral acids?

OBSTETRICS.

1. (a) Name the internal generative organ in the female. (b) Give brief description of each, and (c) functions of each.
2. (a) Describe the phenomena of menstruation. (b) State the changes that occur in the uterus during menstruation.
3. (a) Describe the fetal circulation. (b) What changes occur at birth?
4. Give (a) probable and (b) certain signs of pregnancy. (c) Give Hegar's sign and method of eliciting it.
5. (a) State three of the most common conditions that might be mistaken for pregnancy. (b) Give differential diagnosis.
6. Give (a) etiology, (b) symptoms, (c) treatment of albuminuria of pregnancy.
7. Give (a) principal causes of post-partum hemorrhage and (b) treatment.
8. (a) What conditions justify the induction of premature labor? (b) How should it be performed?
9. (a) Give symptoms of puerperal fever. (b) How would you guard against it, and (c) how treat it if it does occur?
10. Give (a) diagnosis of a breech presentation, and (b) management.

GYNECOLOGY.

1. Give (a) causes and (b) treatment of pruritus vulvæ.
2. Give (a) etiology, (b) symptoms, and (c) treatment of acute cystitis.
3. Give (a) etiology, (b) symptoms, and (c) treatment of prolapse of the uterus.
4. (a) Name the most common causes of sterility in woman and (b) state what can be done to overcome them.
5. (a) Give differential diagnosis between early pregnancy and a small fibroid tumor. (b) How would you replace a retroverted uterus?

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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

VERMONT STATE BOARD OF MEDICAL REGISTRATION.

ANATOMY.

2. Poupart's ligament is formed by the lower border of the aponeurosis of the external oblique muscle; it extends from the anterior superior spine of the ilium to the spine of the pubes.

4. The structures which pass through the foramen magnum are: the medulla and its membranes, vertebral arteries, spinal accessory nerves, anterior and posterior spinal arteries, and the occipito-axial ligament.

5. In Scarpa's triangle the following structures are found, from without inward: external cutaneous nerve, anterior crural nerve, femoral artery, femoral vein.

7. The *Lateral ventricles* of the brain are bounded: *Above*, by the corpus callosum. *Below*, by the caudate nucleus of the corpus striatum, the tænia semicircularis, part of the optic thalamus, choroid plexus, and fimbriated edge of the fornix. *Internally*, by the septum lucidum.

The *third ventricle* is bounded: *Above*, by the fornix, and velum interpositum. *Below*, by the lamina cinerea, tuber cinereum, infundibulum, corpora albicantia, and posterior perforated space. *In front*, by the anterior commissure, and the anterior pillars of the fornix. *Behind*, by the posterior commissure, the iter a tertio ad quartum ventriculorum. *Laterally*, by the optic thalami and the peduncles of the pineal gland.

The *fourth ventricle* is bounded: *Above*, by the valve of Vieussens and the cerebellum. *Below*, by the pons and medulla. *Laterally*, by the superior peduncles of the cerebellum, restiform bodies.

The *fifth ventricle* is between the two layers of the septum lucidum, and is therefore between the two lateral ventricles. It is covered over by the corpus callosum.

10. The broad ligaments of the uterus contain the following structures: The Fallopian tubes, the round ligament, the ovary and ligament, the parovarium, loose connective tissue, blood-vessels, and nerves.

BACTERIOLOGY.

1. Two most common pyogenic bacteria:

(1) *Staphylococcus pyogenes albus*. It is a saprophyte; small round-celled with a diameter of about one mikron; clusters in groups like a bunch of grapes; it is facultative anaërobic; it is nonmotile, and has no flagella.

(2) *Staphylococcus pyogenes aureus*. It is very much

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like the above, only it forms a golden yellow pigment, whereas the *Staphylococcus pyogenes albus* does not.

In *Erysipelas* may be found the *Streptococcus erysip-
elatis*, or *streptococcus pyogenes*.

In *Cellulitis* may be found the *staphylococcus pyogenes aureus*, *citreus*, and *albus*, the *streptococcus pyogenes*, *pneumococcus*, *gonococcus*, *bacillus ærogenes capsulatus*, *bacillus maligni œdematis*.

In *Pyemia* may be found the *streptococcus pyogenes*, *staphylococcus pyogenes aureus*, *pneumococcus*, *bacillus pyocyaneus*, *bacillus coli communis*, *bacillus typhosus*, *bacillus tetragenus*.

2. The bacteria liable to be mistaken for the tubercle bacillus are: the bacillus of leprosy, the bacillus of the smegma, and Lustgarten's bacillus. "The differential diagnosis between these four organisms depends upon the following reactions: When stained by the carbol-fuchsin method, commonly employed in staining the tubercle bacillus, the Lustgarten's bacillus becomes almost instantly decolorized by treatment with mineral acids, particularly sulphuric acid; whereas the smegma bacillus resists such treatment for a much longer time, and the lepra and tubercle bacillus for a still longer time. On the other hand, if decolorization is practised with alcohol instead of acids, the smegma bacillus is the first to lose color. The bacillus tuberculosis and the bacillus of leprosy are both very retentive of their color, even after treatment with acids and alcohol. If, then, we treat the preparation, stained with carbol-fuchsin, with sulphuric acid, Lustgarten's bacillus becomes almost at once decolorized. If it is not immediately decolorized, heat with alcohol; if it is then decolorized, it is the smegma bacillus. If it is still not decolorized, it is either the leprosy or the tubercle bacillus." (From Park's *Pathogenic Bacteria*.)

3. Ptomaines are basic, nitrogenous organic substances produced by bacteria. "Owing to the wide variations in the chemical constitution of the ptomaines, they possess no characters by which they can be distinguished as a class. Some are strongly alkaline and basic, others only feebly so. Some are liquid, oily and volatile, others fixed and crystalline. Some are very prone to oxidation, and are active reducing agents, others are quite stable. For the same reason, no analytical method is possible by which vegetable alkaloids and ptomaines can be separated from each other *en masse*, nor are any reactions known to which all ptomaines respond while vegetable alkaloids do not, or the reverse." (Witthaus' *Manual of Chemistry*.)

Three sources of ptomain poisoning: Canned meats, ice-cream, and decomposing fish.

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4. Widal's test in typhoid fever "depends upon the fact that serum from the blood of one ill with typhoid fever, mixed with a recent culture, will cause the typhoid bacilli to lose their motility and gather in groups, the whole called 'clumping.' Three drops of blood are taken from the well-washed aseptic finger tip or lobe of the ear, and each lies by itself on a sterile slide, passed through a flame and cooled just before use; this slide may be wrapped in cotton and transporetd for examination at the laboratory. Here one drop is mixed with a large drop of sterile water, to redissolve it. A drop from the summit of this is then mixed with six drops of fresh broth culture of the bacillus (not over twenty-four hours old) on a sterile slide. From this a small drop of mingled culture and blood is placed in the middle of a sterile cover-glass, and this is inverted over a sterile hollow-ground slide and examined. . . . A positive reaction is obtained when all the bacilli present gather in one or two masses or clumps and cease their rapid movement inside of twenty minutes." (From Thayer's *Pathology*.)

5. "*Serum therapy* depends upon the fundamental fact that a group of body cells—for example, those of the central nervous system—have a way of rising to the emergency when compelled to defend themselves against a group of foreign cells (*e.g.* tetanus bacilli) and of producing in excess substances antagonistic to such foreign cells or to their products. Such an antagonism is known as immunity. To be immune against a given cell is to possess the power of poisoning or dissolving that cell. This is known as antibacterial immunity. When the body is attacked, not by cell groups but by cellular products, such as toxins, another type of immunity is produced by virtue of which the blood of the immunized individual is able to neutralize and render inert the toxin molecules." (*Reference Handbook of the Medical Sciences*.)

Diseases in which it has been successfully employed are: Diphtheria, tetanus, snake-bites, and rabies.

PHYSIOLOGY.

2. The functions of epithelium are: (1) Protection, (2) secretion, (3) motion (ciliary), (4) special sensation, (5) absorption.

3. Cartilage has no blood-vessels, but is nourished from perichondrium, from synovial membrane, and from bone.

4. Arterial blood is bright red in color, contains more oxygen, less carbon dioxide, more water, and is slightly warmer.

Venous blood is purple in color, contains less oxygen,

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more carbon dioxide, less water, and is slightly cooler (except in the hepatic vein).

6. The *function of the epiglottis*, is: (1) To prevent food and drink entering the larynx; (2) to modify the voice.

7. Enzymes are unorganized ferments which are the result of the activity of special cells of the animal body.

8. If the ductus communis choledochus were obstructed: there would be an increase in fermentation and putrefaction, an impairment of the emulsification of fats, an increase in peristalsis, and perhaps diarrhea.

10. The *function of the dura* is protection: It forms the internal periosteum of the skull, it forms three partitions for the support of the parts of the brain, it forms sinuses or venous channels for the return of the blood from the brain, and it forms sheaths for the nerves as they leave the skull. The function of the *arachnoid* is lymph supply; of the *pia*, blood supply and nutrition.

HYGIENE.

1. The impurities in water that may cause diarrhea, are: Suspended mineral matters, suspended animal (fecal) and vegetable matters, fetid gases, and an excess of dissolved nitrogenous organic matter.

2. Hygienic precautions to be taken in treating a case of tuberculosis: "The patient's quarters should be free from dust, and admit of spending many hours daily in the open air in all weathers, properly sheltered, and, if very ill, lying wrapped in a hammock or reclining chair. His bedroom should be well aired at night, draughts being avoided. The room should be uncarpeted and free from hangings. It should be often cleaned and periodically disinfected. All sputum should be collected in paper spit-cups, which should be burned daily. Smoking should be forbidden. Harm is done by any exercise which results in fatigue, and while fever exists it should not be attempted at all. Patients should be taught the necessity of practising lung gymnastics and breathing only through the nose, which should be kept clear and free from occlusion by secretions, or an hypertrophied catarrhal mucosa. . . . The clothing should be woollen, but not too heavy, or sweating is increased; and a flannel nightgown and loosely knit leg-gings should be worn at night in cool weather. The skin should be cleansed by daily sponge-baths of lukewarm alcohol and water." (Thompson's *Practical Medicine*.)

4. The following is Bartholow's formula for making beef-tea: A pound of lean beef should be freed from fat, tendon, cartilage, bone, and vessels; it must be chopped up fine, and put in a pint of cold water to digest for two

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hours. It should simmer on the range or stove for three hours, but the temperature should not exceed 160° Fahr. The water lost by evaporation should be made up by the addition of cold water, so that a pint of beef-tea should represent one pound of beef. It should be strained, the beef being carefully expressed.

5. "Among the most common of the diseases and parasites of animals, which are communicable to man, are: (1) Glanders, a disease of the genus *Equus*, generally fatal when contracted by man; (2) anthrax, a disease of horses, cattle, sheep, and swine, appearing in man either as malignant pustule or as internal anthrax, and often fatal; (3) tuberculosis, a disease common in cattle and swine, but also occurring in horses, sheep, goats, dogs, poultry, cage birds, and menagerie animals; (4) rabies, a disease of the genus *Canis*, communicable to all warm-blooded animals and to man; (5) epizootic apthæ, commonly known as foot-and-mouth disease, a very infectious malady of cattle, sometimes communicated to the consumers of the milk of diseased cattle; (6) *Cysticercus bovis*, found in cattle, is the larval form of the tapeworm of man known as *Tania saginata*; (7) *Cysticercus cellulosæ*, found in swine, is the larval form of the tapeworm of man known as *Tania solium*; (8) the *Trichina spiralis*, a common parasite of swine, may develop in man and sometimes produces fatal results; (9) the *Echinococcus* found in the lungs, liver, and other organs of the meat-producing animals is the cystic phase of the *Tania echinococcus* of the dog.

"It is evident that the most satisfactory way of protecting man from this source of danger is to eradicate these diseases and parasites so far as possible from the domesticated animals. As complete eradication cannot be accomplished for many years and in some cases not at all, there must be constant efforts for repression and control. People must be made familiar with the dangers; too close association with animals should be avoided; the inspection of meat and of dairy cows should be universal; swine flesh should be well cooked; hides, wool, and hair, often infected with the anthrax bacillus, should be handled with suitable precautions; biological products used for the prevention or cure of human diseases should be surrounded with every safeguard to avoid contamination." (*Reference Handbook of the Medical Sciences.*)

PRACTICE.

1. Typhoid fever is preventible. When the municipal authorities do not consider it their duty to supply pure water, each household should boil all water that is to be

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used for drinking or for washing dishes, etc.; milk should be boiled also; and no ice should be put in water or other drink or food; flies should be kept out of the house as far as possible, by means of screens or otherwise; all discharges from the sick person must be disinfected; all utensils, dishes, etc., used by the patient must be thoroughly cleansed, and boiled every day; soiled linen must be soaked in a disinfectant solution before being washed; after each attendance on a patient, physicians, nurses, and others should wash their hands in a disinfectant; thorough sterilization of all bedding, etc., must be performed after the disease is over.

3. *Prognosis in pulmonary tuberculosis.* The duration of the disease is variable, but averages about two to two and a half years. According to Osler, "the following may be considered favorable circumstances in the prognosis of pulmonary tuberculosis: A good family history, previous good health, a strong digestion, a suitable environment, and an insidious onset, without high fever, and without extensive pneumonic consolidation. Cases beginning with pleurisy seem to run a more protracted and more favorable course. Repeated attacks of hemoptysis are unfavorable."

8. The most frequent valvular lesion of the heart is mitral regurgitation; then follow mitral stenosis, aortic regurgitation, and aortic stenosis, but the order of these varies according to different writers; tricuspid regurgitation is next; and the least frequent are tricuspid stenosis, pulmonary regurgitation, and pulmonary stenosis, but not necessarily in this order.

10. Vertigo may indicate: Neurasthenia, congestion, or anemia of the brain, eyestrain, disease of the internal ear, meningitis, tumor of cerebrum or cerebellum, gout, indigestion, heart disease, arteriosclerosis, autointoxication. It may also be caused by certain drugs.

PATHOLOGY.

1. In *pernicious anemia* the blood would show: (1) A diminution in the number of red corpuscles; (2) a relative increase in the amount of hemoglobin; (3) poikilocytosis; (4) the presence of nucleated red cells; (5) variation in the size of the red cells; (6) the leucocytes may be diminished.

2. In *locomotor ataxia*, the posterior columns of the spinal cord are gray and shrunken and show considerable overgrowth of connective tissue in the columns of Goll, Burdach, and Lissauer; this process extends upward from the lumbosacral region; the posterior nerve roots degenerate and become atrophic. The meninges over the al-

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fects parts become opaque and adherent. Some of the cranial nerves may also atrophy, notably the optic, but also the motor oculi and vagus.

3. In *chronic parenchymatous nephritis*, "both degenerative and proliferative changes are seen. The tubular epithelium is always more or less affected, showing signs of cloudy swelling, fatty degeneration, desquamation, and disintegration, most marked in the convoluted tubules, but also present in the loops and collecting tubules. The distribution of these changes is usually patchy, giving rise to mottling of the cortex. The lumina of the tubes may be dilated, and contain granular and fatty matters, and hyaline casts, the latter formed by coagulation of exudation in the tubules. The glomeruli may occasionally appear normal, but there is almost always some swelling and hyaline degeneration, together with some proliferation and desquamation, of the epithelium, so that they become highly cellular. Occasionally the glomerular changes may be more marked than the tubular; fatty degeneration of the glomerular and capsular epithelium may be prominent, or there may be swelling, proliferation, and desquamation of the epithelium, or both these changes may be combined. The glomerular vessels may be compressed, their endothelium degenerate, and they may become obstructed by leucocytes or by hyaline thrombi, and finally obliterated. Interstitial changes, though present, are not conspicuous, and consist of edema, and scattered foci of round-celled infiltration about the glomeruli and veins. Sometimes hemorrhages are evident in some of the glomeruli and the corresponding tubules. Lardaceous infiltration frequently accompanies parenchymatous nephritis."

In *chronic interstitial nephritis*, "the lesions are principally seen in the cortex; at first patches of cellular infiltration appear, then the intertubular connective tissue becomes increased and fibrous, with destruction of glomeruli and the corresponding tubules. The glomerular epithelium becomes swollen and desquamates, Bowman's capsules may be much thickened by concentrically arranged layers of nucleated fibrous tissue, and the Malpighian bodies in places may be converted into nodules of fibrous tissue, in others into cysts. The corresponding tubules undergo atrophy with disintegration of their epithelium; here and there multiplication, with convolution of the tubules, may be present, suggesting an adenomatous formation. There is everywhere an increase of the stroma, in the cortex and pyramids, between the tubules, and around the glomeruli and vessels, with pronounced round-celled infiltration or well formed fibrous tissue, in which calcification may occur. The vessel walls are thickened, chiefly

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owing to an endarteritis. Lardaceous infiltration may accompany the interstitial nephritis." (Hewlett's *Pathology*.)

SURGERY.

1. *Suppuration* is a special form of inflammation, in which the exudate is unusually prolific in cells, and in which pus is found. The cause of suppuration is the invasion of the tissues by pus-producing bacteria, when the said tissues are in a state of lowered vitality or are not capable of withstanding and disposing of the bacteria and their products.

4. Fractures are variously classified:

- (a) Simple, compound, and complicated.
- (b) Complete (transverse, oblique, spiral, longitudinal) and incomplete (fissured, greenstick).
- (c) Single and multiple.
- (d) Comminuted, impacted, etc.
- (e) Intra- and extraarticular; intra- and extracapsular.

The *general symptoms of fracture*, are: History of injury, disability, pain, swelling, deformity, abnormal mobility, and crepitus.

7. The *symptoms of vesical calculus*, are: Increased frequency of micturition; pain at end of urination, chiefly felt at the end of the penis or in the neck of the bladder; the urine may contain pus, mucus, or blood; a "click" can be obtained by using a searcher or sound; examination by the cystoscope may reveal the presence of the stone.

LEGAL MEDICINE.

1. Insanity is defined, in Allbutt's System of Medicine, as "such a disorder or disease of the nervous system as prevents the individual from reacting normally as a member of the society to which by birth and education he belongs."

2. *Atelectasis* is the condition in which some of the air-vesicles of the lung are not inflated, and hence there is imperfect expansion of the lung.

Its effect on the new-born is to cause pallor or cyanosis, rapid and shallow respirations, and feeble cry; the infant is weak.

3. The use of medical examination in life insurance is to enable the company to form an estimate of the general health of the applicant and so to gauge his expectation of life.

4. *Rape* is carnal knowledge of a female by a man, unlawfully, forcibly, and without her free consent.

The *medical evidence* is based on: (1) Marks of violence about the woman's genital organs; (2) wounds, bruises, or other marks of injury on the woman or on the

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accused; (3) blood stains and seminal stains on the person or clothing of either party; and (4) the presence of any venereal disease on either party.

CHEMISTRY.

1. *Elementary matter* is such matter as cannot by any known means be split up into other kinds of matter.

Compound matter is such matter as is made up of two or more kinds of elementary matter chemically united, in definite proportions.

2. Groups of atoms represent molecules.

The chemical notation of an atom is termed a symbol; of a molecule, a formula.

3. *Normal salts* are those in which all the hydrogen of the acid has been replaced.

Acid salts are those in which only a part of the hydrogen of the acid has been replaced.

Basic salts are compounds of normal salts with the hydroxide, or oxide, of a metal.

Double salts are those which are formed by the substitution of different elements or radicals for two or more atoms of the replaceable hydrogen of the acid.

When one molecule each of hydrogen and chlorine unite, two molecules of hydrochloric acid are formed.

4. *AMMONIA. Composition*, three atoms of hydrogen chemically united with one atom of nitrogen: NH_3 .

Formation, by heating a solution of ammonium hydroxide: $(\text{NH}_4)\text{HO} = \text{H}_2\text{O} + \text{NH}_3$.

Properties, a colorless gas with a pungent irritating odor, and a caustic taste; it is very soluble in water, also in alcohol; it combines readily with water; it also combines with acids to form ammonium salts, this union is direct, and hydrogen is not separated.

5. *Properties of urea*: It is a crystalline solid, soluble in water, colorless, odorless, with a slightly bitter taste; it is neutral in reaction, but basic in character; dilute aqueous solutions are not decomposed by boiling, but by prolonged boiling urea is hydrolyzed to ammonia and carbon dioxide; urea forms compounds with acids and also with certain salts and oxides.

Why urates form deposits in joints and cartilages is not known.

MATERIA MEDICA AND THERAPEUTICS.

1. *NUX VOMICA. Preparations*: Extract, fluid extract, and tincture of nux vomica; strychnine, sulphate, and nitrate of strychnine.

Alkaloids: Strychnine and brucine.

Physical action: It excites the digestive secretions, increases the appetite, increases peristalsis, and improves the

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digestion; it is a vasoconstrictor, it raises blood pressure, and is a cardiac stimulant; it is also a respiratory stimulant; hearing and sight are rendered more acute.

2. ARSENIC could be *prescribed in*: Malaria, gastric ulcer, and cancer, dyspepsia, anemia, chlorosis, chorea, neurasthenia, rheumatism, chronic skin diseases, lupus.

Three preparations, with dose: Liquor potassii arsenitis, ℥vii; Arseni trioxidum, gr. 1/30; Liquor sodii arsenatis, ℥v.

3. A Vasodilator—Amyl nitrite. Indicated in: Angina pectoris, cardiac dyspnea, epilepsy, asthma, tetanus, and migraine.

A Vasonconstrictor—Adrenalin. Indicated in: Hemorrhages, hay fever, bronchial asthma, Addison's disease.

4. *Dose of apomorphia*: gr. 1/10 of the hydrochloride. *Therapeutic uses*: As an emetic, an expectorant (in acute and chronic bronchitis, catarrhal pneumonia, pulmonary tuberculosis).

8.

	DOSE FOR CHILD OF ONE YEAR.	DOSE FOR ADULT.
Acetanilid.....	Should not be given.	gr. iv.
Morphine.....	gr. 1/100.	gr. 1/4.
Hyoscin.....	Should not be given.	gr. 1/128.

OBSTETRICS.

4. (a) *Probable signs of pregnancy*: (1) Progressive enlargement of the uterus; (2) Hegar's sign; (3) Braxton Hick's sign; (4) uterine murmur; (5) cessation of menstruation; (6) changes in the breasts; (7) discoloration of the vagina and cervix; (8) pigmentation and striae; (9) morning sickness.

(b) *Certain signs of pregnancy*: (1) Hearing the fetal heart sound; (2) active movements of the fetus; (3) ballottement; (4) outlining the fetus in whole or part by palpation; and (5) the umbilical souffle.

(c) *Hegar's sign* consists in a thinning and softening of a segment of the body of the uterus immediately above the cervix.

It is elicited by pressing the finger of one hand into the vagina, high up behind the cervix, and with the fingers of the other hand making pressure externally above and behind the symphysis pubis.

5. (a) Three of the most common conditions that may be mistaken for pregnancy are: (1) Ovarian cystoma; (2) ascites; (3) uterine fibroid.

(b) *Differential diagnosis.—Pregnancy*: The tumor is

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hard and does not fluctuate, is situated in the median line, and may give fetal heart sounds and movements; the cervix is soft, and the other signs of pregnancy are present. The rate of growth of the tumor, and the general condition of the patient's health may also help in arriving at a diagnosis.

Ovarian cystoma: Absence of the chief signs of pregnancy; there may be the characteristic facies, the tumor is soft, fluctuating, is more to one side, and does not show fetal signs.

Ascites: Absence of the signs of pregnancy; the abdomen is distended, but the shape varies with the position of the patient; on lying down there is bulging at the sides; the tumor fluctuates, and percussion shows dullness in the flanks, with resonance in the median line, but the dullness varies with the position of the patient.

Uterine fibroid: Menstruation is irregular and sometimes very profuse; absence of the signs of pregnancy; the tumor is nodular, firm, irregular in outline, and while generally placed somewhat centrally is not in the median line, and is not symmetrical; the rate of growth is irregular, being, as a rule, slow, and sometimes extending over years.

GYNECOLOGY.

1. (a) *Pruritus vulvæ* may be caused by: Parasites; diseases of the vulva, as inflammation, edema, vegetations, congestion, irritating discharges, lack of cleanliness, diabetic urine; it may also be of nervous origin, or idiopathic.

(b) *Treatment* consists in removing the cause, if possible; cleanliness, fresh air, tonics, and general attention to hygiene; local applications of solution of bichloride of mercury, 1:2,000; or carbolic acid, 1:100; or lead and opium; dusting powders of bismuth subnitrate, calomel, or zinc oxide are also useful.

2. ACUTE CYSTITIS.—(a) *Etiology:* Various pathogenic bacteria, foreign bodies, traumatism, retention of urine, unclean catheters, cold.

(b) *Symptoms:* Frequent urination, with tenesmus and a burning sensation in the urethra, later on pain in the bladder, hematuria, and the urine contains pus and epithelial cells. Chills, rapid pulse, fever, and headache may also be present.

(c) *Treatment* includes: Rest, administration of plenty of cold water or milk, diuretics, bland and mild food, laxatives, hot sitz baths or vaginal douches, irrigation of the bladder with antiseptic solution followed by solution of nitrate of silver.

4. (a) *The most common causes of sterility in woman,*

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are: Gonorrhea, absence or errors in development of any part of the genital tract, malformations of genitals, fistulæ, lacerations, obesity, alcoholism, pelvic inflammations, dyspareunia, inflammations of uterus, tubes, or ovaries, elongated cervix.

(b) *Treatment* consists in removing the cause, if possible; curettage has been recommended; in the presence of developmental errors, little or nothing can be done; atresia of cervix can be treated by dilatation; if the uterus is misplaced it must be replaced.

STATE EXAMINATION QUESTIONS.

VIRGINIA STATE MEDICAL EXAMINING BOARD.

ANATOMY.

1. Describe the upper extremity of the ulna.
2. Describe the ligaments of the hip joint.
3. Describe the pectoralis major muscle, giving origin, insertion, actions, and shape.
4. Give the relations of the cervical portion of the left common carotid artery.
5. Describe the phrenic nerve, giving origin, course and distribution.
6. Describe the receptaculum chyli and thoracic duct.
7. Give the structure of the testis, and name its investing tunics.
8. Describe the inguinal canal.

PHYSIOLOGY.

1. What changes does the blood in the pulmonary artery undergo in its passage through the lungs?
2. Describe the pancreatic juice, naming its ferments and describing the part each plays in digestion.
3. In what manner is heat given off from the body and from what sources does the greatest loss occur?
4. What circumstances influence secretion in a gland?
5. Describe vomiting and its mechanism.

CHEMISTRY.

1. What is meant by the terms synthetic chemistry, analytical chemistry, physiological chemistry, quantitative and qualitative analysis?
2. What is meant by the boiling and the melting of a substance? By sublimation? By distillation?
3. What is the chemical difference between ferrous and ferric salts? Give formulæ showing the difference.

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4. How does sodium occur in nature? Give formulæ of three sodium salts. Give process for manufacturing sodium carbonate on large scale.

5. What are carbohydrates? How do they differ from hydrocarbons?

6. Explain the composition and manufacture of soap, and state the difference between hard and soft soaps.

MATERIA MEDICA.

1. Name the official preparations of opium and belladonna. Give dose of each.

2. State effect of sodium carbonate and bicarbonate on gastric digestion before and after meals.

3. Define an alkaloid; name six, with dose of each.

4. Give an example of the following, with dose: Antispasmodics, antipyretics, hypnotics, narcotics, emetics, expectorants, diuretics, anthelmintics.

5. Write fifteen lines on the physiological action of alcohol.

6. Symptoms of phosphorus poisoning.

THERAPEUTICS.

1. Mention the therapeutic uses of the syrup of hydriodic acid.

2. What are the therapeutic uses of salol? (b) What symptoms indicate the discontinuance of its use? (c) In what pathological conditions is it contraindicated?

3. Mention the therapeutic uses, external and internal, of nitrate of silver.

4. In what pathological conditions is uva ursi used?

5. Give the indications for the therapeutic uses of hyoscyamus.

6. Give the common name, the dose, and the therapeutic uses of potassium bitartrate.

TOXICOLOGY.

1. Give test for arsenic poisoning.

2. Give symptoms and treatment of carbolic acid poisoning.

3. Give diagnosis and treatment of cocaine poisoning.

MEDICAL JURISPRUDENCE.

1. Give signs of pregnancy at first, and third, and sixth months.

2. Give postmortem evidences of miscarriage.

3. What is the period of gestation in the human family? How is it estimated?

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PRACTICE.

1. Distinguish between lithemia and uremia.
2. What functions are at fault in their causation, and to what end should remedial measures be directed?
3. Give cause and clinical symptoms of diphtheria.
4. How, where and in what quantities should antitoxin be administered?
5. What is infantile scurvy? How remedied?
6. Give treatment for delirium tremens.
7. State cause and give treatment for the most common form of malarial fever.
8. Outline prophylactic measures against malaria.
9. Give symptoms and treatment of lobar pneumonia.
10. Give symptoms, and outline management, of a case of paralysis agitans.
11. Give treatment of enuresis nocturna.
12. Give symptoms and treatment for arteriosclerosis.

SURGERY.

1. Describe the operation of excision of the elbow joint, and state when it is indicated.
2. What is lupus vulgaris? Give diagnosis and treatment.
3. Describe every detail in the operation for ligation of the external iliac artery.
4. Give diagnosis and treatment of fracture of the outer third of the clavicle.
5. What is a sprained joint? Give treatment and prognosis.
6. What is rickets? Give causes, symptoms, prognosis, and treatment.
7. There are three classes of knee-joint inflammation: Synovitis, capsular arthritis and osteoarthritis. Differentiate them.
8. You are called to see a patient who is totally unconscious and insensible to pain; there are no movements of any kind. The pulse is slow, the respiration slow and probably shallow, and the pupils either widely dilated or closely contracted, or one pupil contracted and the other dilated. On inquiry, you get the history of a fall or blow on the head, yet the visible evidence of such is slight. What would be your diagnosis and treatment?

OBSTETRICS, GYNECOLOGY, AND PEDIATRICS.

1. Describe in detail the certain signs of pregnancy.
2. Give the symptoms and treatment of toxemia of pregnancy.
3. Management of the mother from the beginning to the third stage of labor, and to the fourth day of the puerperium.

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4. Name the causes that may give rise to fever during the puerperium.
5. What are the most frequent infective agents, in the causation of pelvic abscesses, mentioning the usual sites of such abscesses?
6. What cogent reasons may be urged for the utmost conservatism in operations upon the tubes and ovaries?
7. Give the most efficient treatment for urethral caruncle.
8. Differentiate spasmodic from membranous croup; treatment of the latter.
9. What diseases are conveyed by cow's milk, and what prophylactic rules should be instituted in such cases?
10. Give the etiology, symptomatology, and differential diagnosis of infantile scurvy.

LARYNGOLOGY.

1. Give symptoms, etiology, prognosis and treatment of edema of larynx.
2. Define laryngismus stridulus, its symptoms and treatment.
3. Name most common causes, symptoms and the precaution to be taken in opening retropharyngeal abscesses.

RHINOLOGY.

1. Excluding traumatic and local causes, what diseases affecting the composition and circulation of the blood frequently cause epistaxis?
2. Describe objective and subjective symptoms and treatment of postnasal adenoid hypertrophy.

OTOLOGY.

1. For relief of what condition should puncture of drum-membrane be performed by the surgeon?
2. What are the two most frequent causes of deafness? Give treatment of each class.

OPHTHALMOLOGY.

1. Name the respective diseased conditions under which occur, viz.: (a) Yellow sclerotic, (b) bluish-white or pearl sclerotic, (c) an inflamed or injected conjunctiva.
2. Name most common causes and varieties of iritis, with symptoms and treatment.
3. What symptom in eye disease would indicate glaucoma in its early state? Explain importance of its early recognition. What is best treatment, and, if successful, what benefit is to be anticipated?

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NEUROLOGY.

1. Give the diagnosis and prognosis of epilepsy.
2. Give definition and commonest causes of multiple neuritis.
3. Give the treatment of migraine (sick-headache).

PATHOLOGY.

1. Explain the difference between degeneration and infiltration.
2. Name the varieties of chronic nephritis, and state how they differ pathologically.
3. What is ascites? State its causes.
4. Name the tumors which have epithelium as a physiological prototype, and state which are malignant and which benign.
5. Explain the difference between puerperal septicemia and sapremia (septic intoxication).
6. Give the nature and origin of pus cells, and the origin of the liquid of pus.

BACTERIOLOGY.

1. Describe the *Streptococcus pyogenes*, naming some of the most important pathological conditions caused by it.
2. Give the bacteriology of catarrhal pneumonia.
3. Give the bacteriology of dysentery.

HYGIENE.

1. In making a qualitative test of drinking water, what impurities should be sought for?
2. What is the duty of the State to persons imprisoned for crime.
3. Give periods of incubation of measles, smallpox, diphtheria, scarlet fever, whooping cough and typhoid fever.

HISTOLOGY.

1. Describe the malpighian body in the kidney.
2. What type of gland is the thyroid? Describe its structure.

EMBRYOLOGY.

1. Describe the fertilization of the ovum.
2. Describe the development of the primitive alimentary canal.

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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

VIRGINIA STATE MEDICAL EXAMINING BOARD.

PHYSIOLOGY.

1. In its passage through the lungs, the blood in the pulmonary artery: (1) becomes cooled; (2) becomes a brighter red color; (3) gains oxygen (about 10 or 12 volumes); (4) loses carbon dioxide (about 7 volumes).

2. The pancreatic juice is a clear, viscid, alkaline fluid, and contains about three per cent. solids.

It contains four ferments: (1) *Trypsin*, which changes proteids into proteoses and peptones, and afterwards decomposes them into leucin and tyrosin; (2) *Amylopsin*, which converts starches into maltose; (3) *Steapsin*, which emulsifies and saponifies fats; and (4) a ferment which curdles the casein of milk.

3. Heat is given off from the body by conduction, convection, radiation, and evaporation of fluid from the surface of the body; also through the urine, feces, and expired air. The greatest loss occurs from the skin.

4. The circumstances which influence secretion in a gland, are: Variations in the quantity of blood supplied to the gland, variations in the nerve impulses conveyed to the gland, various mental conditions, and certain drugs.

5. *Vomiting* is generally preceded by nausea and an increased flow of saliva. Then follow a deep and prolonged inspiration, the closure of the glottis, and fixation of the diaphragm. The abdominal muscles then contract and press the stomach against the fixed diaphragm. The cardiac orifice of the stomach relaxes, the other muscular fibers of the stomach contract, and there is a reversed peristalsis in the esophagus. The center for vomiting is in the medulla.

CHEMISTRY.

1. *Synthetic chemistry* is that branch of chemistry which is concerned with the building up of more complex substances from simpler substances or elements.

Analytical chemistry is that branch of chemistry which is concerned with the resolving of more complex substances into simpler substances or elements.

Physiological chemistry is that branch of chemistry which is concerned with the composition and changes in composition of living things, both in normal and abnormal conditions.

Quantitative analysis is concerned with the determination

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of the quantities of the various components in a given substance.

Qualitative analysis is concerned with the determination of the nature of the components in a given substance.

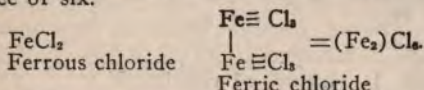
2. *Boiling* is the rapid conversion of a liquid into a gas, at a fixed temperature.

Melting is the passage of a solid body into the liquid state by the action of heat.

Sublimation is the conversion of a solid into a gas (without passing through the liquid state) and the reversion of the gas into a solid. *Example*:—Sulphur can be sublimed by heating in a suitable apparatus.

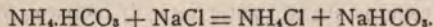
Distillation is the conversion of a liquid into a gas, followed by the reversion of the gas into a liquid. *Example*:—The distillation of water.

3. In *ferrous* salts, the atom of iron is bivalent. In *ferric* salts, the atom of iron is quadrivalent, and two such atoms are connected producing a double atom with a valence of six.



4. Sodium occurs in nature in combination, chiefly as the chloride; also, to a lesser extent, as the carbonate, nitrate, sulphate, etc. Formulæ of three sodium salts:—Sodium chloride, NaCl; Sodium nitrate, NaNO₃; Sodium sulphate, Na₂SO₄.

Sodium carbonate is manufactured on a large scale by the Leblanc process or by the Solvay process. In the latter process ammonium bicarbonate and sodium chloride react upon each other with the production of ammonium chloride and sodium bicarbonate:



The sodium bicarbonate is then dried and heated, when it is decomposed into Na₂CO₃, H₂O, and CO₂.

5. *Carbohydrates* were formerly defined as substances of unknown constitution, composed of carbon, hydrogen, and oxygen; the last two being in the proportion to form water.

Hydrocarbons are compounds containing only carbon and hydrogen.

6. Soaps are the alkali salts of oleic, palmitic, and stearic acids.

They are obtained by boiling glyceryl oleate with sodium hydroxide or potassium hydroxide.

The hard soaps contain sodium; and the soft soaps potassium.

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MATERIA MEDICA.

1. OPIUM. *Official preparations, and dose*:—Pulvis opii, gr. j; extractum opii, gr. ss; pulvis ipecacuanhæ et opii, gr. viij ss; acetum opii, ℥viiij; tinctura opii, ℥viiij; tinctura opii camphorata, ℥ij; tinctura opii deodorata, ℥viiij; tinctura ipecacuanhæ et opii, ℥viiij; vinum opii, ℥viiij.

BELLADONNA. *Official preparations, and dose*:—Extractum belladonnæ foliorum, gr. i/5; tinctura belladonnæ foliorum, ℥viiij; fluidextractum belladonnæ radice, ℥j.

2. Given before meals, they increase the acid secretion of the stomach; given after meals, they tend to neutralize the acidity of the stomach contents.

3. An *alkaloid* is an organic, nitrogenized substance, alkaline in reaction, and capable of combining with acids to form salts in the same way that ammonia does.

Strychnine sulphate, gr. 1/64; morphine sulphate, gr. 1/4; atropine sulphate, gr. 1/150; aconitine, gr. 1/400; apomorphine hydrochloride, gr. 1/10 (as an emetic); quinine sulphate, gr. iv.

4

Antispasmodic	Tincture of valerian, ℥j.
Antipyretic	Tincture of aconite, ℥x.
Hypnotic	Chloral hydrate, gr. xv-xx.
Narcotic	Morphine sulphate, gr. 1/4.
Emetic	Apomorphine hydrochloride, gr. 1/10.
Expectorant	Fluid extract of squill, ℥ij.
Diuretic	Potassium acetate, gr. xxx.
Anthelmintic	Pelletierine tannate, gr. iv.

5. Alcohol, *externally*, acts as a refrigerant, an astringent, a disinfectant, an anhidrotic; it also hardens the skin. *Internally*, it sharpens the appetite, is a digestant, a diuretic, a diaphoretic, is slightly antipyretic, it increases the force and rate of the heart beat and pulse, it is a vasodilator especially to the vessels of the skin, it causes an increase in the blood pressure, it is at first a slight nervous stimulant, but afterwards is a depressant; in large doses it is a narcotic, and then causes a reduction of body temperature.

6. *Symptoms of acute phosphorus poisoning*: "Eructation of gas having the odor of garlic. The mouth, when observed in the dark, is frequently faintly luminous (phosphorescent). After several hours, pain in the throat, a sense of heat in the epigastrium, nausea, and vomiting. The vomited matters are sometimes bloody, and frequently luminous when agitated in the dark. The abdomen is tender, and there are diarrhea and colicky pains. After one or two days these symptoms cease, there remaining only

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pain in the back and limbs, and a feeble pulse. Death sometimes occurs suddenly in from two to four days. Usually, about the fourth day, the patient becomes jaundiced, suffers from headache, insomnia, and retention of urine, rapidly becomes delirious and comatose, and dies."—(Witthaus' *Essentials of Chemistry*.)

THERAPEUTICS.

2. *The therapeutic uses of salol* are: As a disinfectant, in inflammation of the mouth and pharynx, in cystitis, as an intestinal antiseptic in typhoid fever, in muscular rheumatism, in intestinal indigestion and fermentation, in cholera.

(b) *Symptoms indicating its discontinuance*, are: Smoky color of the urine like that of phenol poisoning.

(c) *It is contraindicated* in acute inflammations of the kidney.

3. NITRATE OF SILVER, is used *externally*, for: Conjunctivitis; granular lids; pruritus of genitals or anus; inflammations of the mouth, pharynx, fauces; orchitis and epididymitis; and to prevent the pitting of smallpox; it is also said to abort bedsores and boils.

Internally, it is used: In chronic gastric catarrh, gastritis, and gastric ulcer; intestinal ulceration, epilepsy, and chorea.

4. *Uva ursi* is used in: Pyelitis, cystitis, urethritis, chronic gonorrhea; and sometimes as a mild diuretic.

5. *Indications for the therapeutic uses of hyoscyamus*, are: Whooping cough, colic, nervous cough, asthma, hicough, irritable bladder, as an antispasmodic, to diminish secretions, dysmenorrhea, neuralgia.

6. POTASSIUM BITARTRATE. *Common name*, Cream of tartar; dose, gr. xxx;

Therapeutic uses: As a diuretic, in chronic nephritis, to alkalinize the urine, to remove dropsy.

TOXICOLOGY.

1. *Test of arsenic poisoning*: Reinsch's test is as follows: To the suspected fluid add a little pure HCl; suspend in the fluid a small strip of bright copper foil, and boil. If a deposit forms on the copper, remove the copper, wash it with pure water, dry on filter paper, but be careful not to rub off the deposit. Coil up the copper, and put it into a clean dry glass tube, open at both ends, and apply heat at the part where the copper is. If arsenic is present there will appear in the cold part of the tube a mirror, which will be found on microscopical examination to consist of octahedral crystals of arsenic trioxide.

2. *Symptoms of carbolic acid poisoning*: Buccal mucous

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membrane is whitened and hardened; vomiting; burning pain in mouth, esophagus, and stomach; pulse and body temperature are lowered; the pupils are contracted; collapse, and finally death. The urine may become dark.

Treatment: Emetics, white of egg, soluble sulphates. Alcohol is said to be antidotal.

3. In *cocaine poisoning* there will be found pain and fullness in the head, pulse first quick, later feeble and slow, extremities cold. The symptoms are not constant.

Treatment consists in the administration of ammonia or coffee; morphine, strychnine, chloroform, and ether have all been suggested. The safest plan is to treat whatever symptoms are present.

The *antidote* is said to be amyl nitrite.

SURGERY.

2. *Lupus vulgaris* is a tuberculous infection of the skin; it is generally found upon the face, particularly the nose and cheeks. It begins as a pinkish nodule which is painless, and spreads to other nodules and generally ends in ulceration with destruction of mucous membrane or cartilage. It is to be diagnosed: From (1) *Lupus erythematosus*, which is not supposed to be tuberculous, which is a symmetrical erythema with "butterfly wings," and which does not ulcerate. (2) From *Syphilitic ulceration*, in which the history of the case will help in the diagnosis, the ulcers are characteristic, and respond to syphilitic treatment. (3) From *Epithelioma*, which is more painful, occurs later in life, does not tend to heal, and the ulcer has everted edges.

Treatment. In the early stages the small nodule may be excised. If not seen till later, curettage with a sharp spoon, followed by cauterization with pure carbolic acid, has been recommended. This can be repeated at intervals of three or four weeks if necessary. Finsen light and tuberculin have also been used.

5. A *sprain* is a self-reduced dislocation; generally due to a twist, in which some fibers of the ligaments are stretched or torn, and the synovial membrane contused.

Treatment consists in at once applying cold cloths and compression; the limb should be raised and the joint fixed and firmly bandaged, and kept at rest till the swelling and pain have disappeared. Later on, after the swelling has subsided, hot fomentations and massage are indicated. Passive motion, and later on active motion should be enforced. Adhesive plaster strips placed so as to afford support and fixation without interfering with the circulation in the limb, are recommended.

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Prognosis is good, unless complications are present; the chief danger is ankylosis.

7. In *synovitis*, the synovial membrane alone is inflamed; and the other structures of the joint are unaffected.

In *capsular arthritis*, all the structures of the joint (synovial membrane, cartilage, bones, ligaments) are inflamed.

In *osteoarthritis*, besides the involvement of the parts named in capsular arthritis, new masses of bone are formed.

OBSTETRICS, GYNECOLOGY, AND PEDIATRICS.

1. *The certain signs of pregnancy* are: (1) Hearing the fetal heart sound; (2) active movements of the fetus; (3) ballottement; (4) outlining the fetus in whole or part by palpation; and (5) the umbilical souffle.

2. *TOXEMIA OF PREGNANCY.* The symptoms are:—"Headache, nausea, and vomiting, epigastric pain, vertigo, ringing in the ears, flashes of light or darkness, double vision, blindness, deafness, mental disturbance, defective memory, somnolence; symptoms easily explained by the circulation of toxic blood through the nerve centers. These may be preceded by lassitude, and accompanied by constipation, or by diarrhea. Headache is perhaps the most significant and common warning symptom. In bad cases the urine is reduced in quantity (almost suppressed), very dark in color, its albumin greatly increased, so that it becomes solid on boiling. Next comes the final catastrophe of convulsions. The convulsive fit begins with twitching of the facial muscles, rolling and fixation of the eyeballs, puckering of the lips, fixation of the jaws, protrusion of the tongue, etc., soon followed by violent spasms of the muscles of the trunk and limbs, including those of respiration; hence lividity of the face and stertorous breathing, biting of the tongue, opisthotonus, etc. The fit lasts fifteen or twenty seconds, ending in partial or complete coma, possibly death; or consciousness may return, to be followed by other convulsions." (*King's Manual of Obstetrics.*)

The line of *treatment* as laid down by Edgar is as follows: For *preventive treatment*: (1) The amount of nitrogenous food should be diminished to a minimum; (2) the production and absorption of poisonous materials in the intestines and body tissues should be limited and their elimination should be aided by improving the action of the bowels, the kidneys, the liver, the skin, and the lungs; (3) the source of the fetal metabolic products and the peripheral irritation in the uterus should, if necessary, be removed by evacuating that organ.

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The *curative treatment* includes: (1) Controlling the convulsions (by chloroform, veratrum, or chloral); (2) elimination of the poison or poisons which are presumed to cause the convulsions; (3) emptying the uterus under deep anesthesia, by some method that is rapid and that will cause as little injury to the woman as possible.

4. The causes that may give rise to fever during the puerperium, are pathogenic bacteria (the chief of which are: *Streptococcus pyogenes*, *Staphylococcus pyogenes aureus*, *Staphylococcus pyogenes citreus*, *Staphylococcus pyogenes albus*, *Bacterium coli commune*, *Bacillus pyocyaneus*) introduced into the genital canal of the patient. The most common means of such infection are the hands of the physician, nurse, midwife, or of the patient herself; unclean instruments and catheters; coitus during the time immediately preceding labor; contact with secretions from wounds of any kind, no matter where situated; general unhygienic surroundings, and contact with a patient suffering from scarlet fever or erysipelas on the part of any one attending on the woman.

7. The most efficient treatment for urethral caruncle, is complete excision.

8. *Spasmodic croup* generally comes on suddenly, at night. There is no appreciable fever, no previous malaise or sickness, and often the patient is asleep again by the time the physician arrives. There is frequently a thick tenacious mucus, but neither Klebs-Loeffler bacilli nor streptococci are present. It is entirely a local disturbance.

Membranous croup is either laryngeal diphtheria or a streptococcus infection. In either case there is a prior stage of malaise, accompanied by chills, fever, and sore throat. The fever may become very high. A membrane forms, in which are found the Klebs-Loeffler bacillus or streptococci.

The *treatment of membranous croup*:—The patient should be isolated, and put to bed; the atmosphere of the room should be kept moist; the diet must be nutritious and easily digested; diphtheria antitoxin should be administered as soon as possible; alcohol, or strychnine, are indicated; local applications either hot or cold will relieve the pain, mild antiseptic solutions in the nose and throat are often used.

LARYNGOLOGY.

2. *Laryngismus stridulus* is a condition found in rachitic children (generally under two years of age), and characterized by a reflex respiratory spasm of the larynx.

The *symptoms* of laryngismus stridulus are: The child holds his breath, the face becomes congested and cyanotic, the glottis is closed, inspiration is suddenly arrested, and

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ends in a shrill crowing sound; there may be spasms or convulsions; the attack is sudden, and may be repeated; there is no fever, coryza, nor cough.

Treatment: Cold water should be dashed on the face and chest; ammonia may be applied to the nostrils; an emetic may be administered, bromides or chloral should be given; attention must be paid to the diet and general hygiene of the child.

RHINOLOGY.

1. Some of the causes of epistaxis, dependent upon diseases affecting the composition and circulation of the blood, are: Hemophilia, pernicious anemia, leukemia, scurvy, purpura hæmorrhagica, cerebral congestion.

OTOLOGY.

1. Puncture of the drum membrane is performed for the purpose of relieving blood pressure, or of evacuating the fluid contents of the middle ear, for drainage; it is chiefly indicated in otitis media.

2. The two most frequent causes of deafness are: Inflammation of the middle ear, and impacted cerumen.

OPHTHALMOLOGY.

1. (a) A *yellow sclerotic* occurs in jaundice.

(b) A *bluish-white or pearl sclerotic* occurs in: Anemia, nephritis, and phthisis.

(c) An *inflamed or injected conjunctiva* occurs in: Gonorrheal or diphtheritic infection, in measles, hay fever, catarrhal influenza, coryza; sometimes in meningitis and facial paralysis.

2. May give the following *varieties* of iritis, which also includes the *causes*:

(1) According to its *course*, Acute, Subacute, and Chronic.

(2) According to the *pathological products*, Plastic, Serous, Purulent, and Tuberculous.

(3) According to its *etiology*, Syphilitic, Rheumatic, Gouty, Diabetic, Gonorrheal, Tuberculous, Scrofulous, Traumatic, Sympathetic, Secondary, and Idiopathic.

3. Increase in the intraocular tension indicates glaucoma in any stage; dimness of vision is one of the earliest symptoms.

The importance of its early recognition is that treatment may be instituted at an early stage, and blindness be averted.

The best treatment is iridectomy.

If successful, sight is preserved, the progress of the disease is arrested, pain is relieved, and inflammatory symptoms subside.

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NEUROLOGY.

1. *Epilepsy* is diagnosed by the aura, the sudden onset, the cry, the sudden loss of consciousness, the tonic convulsion, the biting of the tongue, the dilated pupils, and the urinary incontinence. In *hysteria*, the patients do not generally, hurt themselves.

Prognosis is not good; some cases may be ameliorated; a few recover, and but few die of the disease; in general, life is shortened by epilepsy.

2. *Multiple neuritis* is an inflammation of several nerve trunks, either simultaneously or in rapid succession.

The commonest causes are: Alcoholism, rheumatism, syphilis, mineral poisons (lead, arsenic, mercury), diabetes, some infectious diseases (malaria, leprosy).

3. *The treatment of migraine*: If possible remove the cause; examine for eyestrain, affections of the nose, indiscretions in diet, and mental and physical fatigue. Rest, in a darkened room, is necessary. The following drugs have been recommended: Phenacetin, caffeine, morphine, the bromides, cannabis indica; also electricity.

PATHOLOGY.

1. *Degeneration* is a local order of metabolism, in which the protoplasm of the cell is gradually changed into a new material.

Infiltration is a local disorder of metabolism, in which new material is deposited in an organ or a tissue. The protoplasm of the cell is only affected mechanically.

2. The various kinds of chronic nephritis are the parenchymatous, and the interstitial.

In *chronic parenchymatous nephritis*, "both degenerative and proliferative changes are seen. The tubular epithelium is always more or less affected, showing signs of cloudy swelling, fatty degeneration, desquamation, and disintegration, most marked in the convoluted tubules, but also present in the loops and collecting tubules. The distribution of these changes is usually patchy, giving rise to mottling of the cortex. The lumina of the tubes may be dilated, and contain granular and fatty matters, and hyaline casts, the latter formed by coagulation of exudation in the tubules. The glomeruli may occasionally appear normal, but there is almost always some swelling and hyaline degeneration, together with some proliferation and desquamation, of the epithelium, so that they become highly cellular. Occasionally the glomerular changes may be more marked than the tubular; fatty degeneration of the glomerular and capsular epithelium may be prominent, or there may be swelling, proliferation, and desquamation of the epithelium, or both these changes may be combined. The glomerular

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vessels may be compressed, their endothelium degenerate, and they may be obstructed by leucocytes or by hyaline thrombi, and finally obliterated. Interstitial changes, though present, are not conspicuous, and consist of edema, and scattered foci of round-celled infiltration about the glomeruli and veins. Sometimes hemorrhages are evident in some of the glomeruli and the corresponding tubules. Lardaceous infiltration frequently accompanies parenchymatous nephritis."

In *chronic interstitial nephritis*, "the lesions are principally seen in the cortex; at first patches of cellular infiltration appear, then the intertubular connective tissue becomes increased and fibrous, with destruction of glomeruli and the corresponding tubules. The glomerular epithelium becomes swollen and desquamates, Bowman's capsules may be much thickened by concentrically arranged layers of nucleated fibrous tissue, and the Malpighian bodies in places may be converted into nodules of fibrous tissue, in others into cysts. The corresponding tubules undergo atrophy with disintegration of their epithelium; here and there multiplication, with convolution of the tubules, may be present, suggesting an adenomatous formation. There is everywhere an increase of the stroma, in the cortex and pyramids, between the tubules, and around the glomeruli and vessels, with pronounced round-celled infiltration or well-formed fibrous tissue, in which calcification may occur. The vessel walls are thickened, chiefly owing to an endarteritis. Lardaceous infiltration may accompany the interstitial nephritis."—(Hewlett's *Pathology*.)

3. *Ascites* is a collection of serous fluid in the peritoneal cavity.

The *causes* are: Portal obstruction, chronic inflammation of the peritoneum, abdominal tumors, cardiac disease, Bright's disease, chronic emphysema, anemia, cirrhosis of the liver.

4. The tumors which have epithelium as a physiological prototype, are: (1) Papilloma, (2) adenoma, (3) carcinoma.

Of these, the first two are benign; and carcinoma is malignant.

5. In *puerperal septicemia* there is a general infection, microorganisms are present in the general circulation; and there is, of course, a local site of infection.

In *sapremia* there is a general infection caused by the absorption of toxins; but the putrefactive germs do not enter the blood.

6. Pus cells are chiefly leucocytes (generally of the polynuclear variety); some are alive but many are dead

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and swollen; infecting bacteria may also be present as well as fixed tissue cells.

BACTERIOLOGY.

1. The *streptococcus pyogenes* is a micrococcus, of spherical shape, and arranged in chains of about thirty or forty cocci (in liquid media), but the chains are much shorter in solid media. Each coccus is about one-half to two mikrons in diameter. It is not motile, does not form spores, does not liquefy gelatin, and stains readily with the ordinary anilin dyes, and by Gram's method.

The most important pathological conditions caused by it, are: Erysipelas, suppurations, malignant endocarditis.

It is often associated with diphtheria and tuberculosis.

HYGIENE.

1. In making a qualitative test of drinking water, the following impurities should be sought for: Lime, chlorine, nitrates, nitrites, ammonia, iron, lead, copper, pathogenic bacteria (including *Bacillus coli communis*), ova of parasitic intestinal worms.

3. The *period of incubation*, of measles, is ten to fourteen days; of smallpox, ten to fourteen days; of diphtheria, two to seven days; of scarlet fever, some hours to six days; of whooping cough, four to fourteen days; of typhoid fever, five to thirty days. These figures are all approximate.

STATE BOARD EXAMINATION QUESTIONS.

STATE MEDICAL EXAMINING BOARD OF WASHINGTON.

SURGERY.

1. Give the differential diagnosis between dislocation of the head of the femur and a fracture of the neck. Describe the treatment of the latter.

2. Give a summary of the treatment of fracture of the patella by the non-operative method.

3. Give the treatment of delayed union in ununited fracture.

4. Describe the different varieties of hernia, and describe one operation for inguinal hernia.

5. Name the different varieties of aneurysm, and the method of treatment of aneurysm in general.

6. Give the symptoms, diagnosis, and treatment of intestinal obstruction.

7. Give the symptoms, diagnosis, and treatment of chronic tuberculosis of the kidney.

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8. Give the treatment of shock resulting from hemorrhage.
9. Give the contraindications for the employment of ether and chloroform.
10. Describe and give treatment of an infection under the palmar fascia.

PREVENTIVE MEDICINE AND MEDICAL JURISPRUDENCE.

1. Differentiate between idiocy and lunacy.
2. How would you determine that a full-term dead babe was born alive or still-born?
3. Give a detail account for an examination of a body from the standpoint of the coroner in charge.
4. How do you determine that an incised wound was inflicted by a blunt or a sharp instrument?
5. What constitutes expert testimony?
6. How long after recovery would you keep in quarantine a case of (a) diphtheria, (b) scarlet fever, (c) small-pox?
7. Name the portals of entry of tubercular infection.
8. State the best means of disinfecting sputum.
9. Describe the difference between contagion and infection.
10. (a) What are the effects of breathing impure air? (b) How many cubic feet per person should be allowed in a room for continued occupancy, and in a sleeping-room.

PRACTICE OF MEDICINE AND DISEASES OF CHILDREN.

1. How would you differentiate between chronic gastritis and carcinoma of the stomach?
2. Define constipation and give its causes, symptoms, effects, and non-medicinal treatment.
3. What is vertigo and its different varieties? Give the diagnosis and treatment of one.
4. Give the etiology, symptoms, and treatment of hydrothorax.
5. Give causes, symptoms, diagnosis, and treatment of myxedema.
6. Describe an attack of angina pectoris. Give its etiology, diagnosis, and prognosis.
7. What is asthma? Give its causes and symptoms.
8. Differentiate between hypertrophy and dilatation of the heart, and outline treatment for each.
9. What are the causes, symptoms, and effects of adenoids?
10. Describe an attack of enterocolitis in a child. Give its etiology and dietetics.

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11. What are the etiology and symptoms of alopecia areata? How is it distinguished from ringworm?

12. Describe an attack of pertussis. Give its etiology, pathology, complications, and sequelæ.

13. What are the etiology, symptoms, and treatment of stomatomycosis?

14. Contrast ordinary dairy milk with human milk, and give a brief description of the essentials for the production of pure dairy milk.

15. Give symptoms and course, with differentiation, prognosis, and treatment of tubercular meningitis in a child.

OBSTETRICS AND DISEASES OF WOMEN.

1. Define presentation and position. Give three examples of each. Which of the latter is the most common?

2. Which is the greatest diameter of the female pelvis, also that of the fetal head? Give the mechanism of rotation of the latter during parturition in the first position.

3. At what time of gestation is the placenta formed? How would you treat an inevitable abortion, subsequent to its formation?

4. In a difficult labor, upon what would you base your decision as to whether Cesarean section or the application of forceps would be the proper procedure?

5. What is placenta prævia? Name the different attachments of the placenta in the same. Give the method of management.

6. Give the symptoms and diagnosis of ectopic gestation.

7. Give the common causes of subinvolution of the uterus and the treatment of each.

8. Define metrorrhagia. Name two of its most common causes prior to the menopause. What would you suspect should it occur subsequent to the same? How would you verify your suspicion?

9. Give your treatment of a recent attack of specific vaginitis. Name two of its most common sequelæ.

10. Give two indications for hysterectomy. Which do you prefer, vaginal or abdominal? State upon what ground you would base your preference.

CHEMISTRY AND TOXICOLOGY.

1. What is an antidote to arsenic? What effect has arsenic on the gastrointestinal canal? What effect has it on the nervous system? In arsenic workers, what local condition may be found upon the hands?

2. What is an antidote to carbolic acid? What combination is formed by its administration? How would you make a diagnosis of carbolic-acid poisoning before death?

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3. Enumerate the symptoms of chronic lead-poisoning and give the treatment.
4. Give the treatment of phosphorus poisoning.
5. What are the symptoms of nitrate of silver poisoning and what are the antidotes?
6. Complete the following formulæ: $\text{Zn} + \text{H}_2\text{SO}_4 = ?$ and $\text{BaO}_2 + 2\text{HCl} = ?$
7. What is an atom and what is a molecule?
8. What are isomeric compounds?
9. Describe the method of detecting uric acid by HNO_3 .
10. Describe in detail a method of the quantitative estimation of sugar in urine.

ANATOMY AND PHYSIOLOGY.

1. Name in order the branches of the arch of the aorta.
2. Give the origin, course, and termination of the thoracic duct.
3. Describe the occipital bone and name the structures passing through the foramen magnum.
4. (a) What tendons form the inner hamstring? (b) The outer hamstring?
5. Describe a lumbar vertebra. In what points does it differ from a dorsal vertebra?
6. Describe the diaphragm. Mention the openings formed by it, and tell what structures pass through each. Give its nerve supply.
7. Describe the circle of Willis, and name the arteries forming it.
8. What are attachments of Poupart's ligament? How is it formed? Give its surgical significance.
9. How is the venous blood current maintained? What arteries carry venous blood?
10. Describe the normal heart sounds. Give causes which produce each.
11. Give the daily amount, composition, and functions of the bile.
12. What part does saliva take in digestion? What is its ferment? Name and give the physiology of the nerve supply.
13. Name and give the function of the various glands of the small intestines.
14. Give the physiology of visual accommodation to light and distance.
15. What is the physiology of blood formation?

HISTOLOGY, PATHOLOGY, AND BACTERIOLOGY.

1. Describe a sebaceous gland.

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2. Name the layers of the mucous membrane, and give the locations where it is found.
3. Describe the cross-section of an artery.
4. Describe the iris.
5. Describe a peptic ulcer of the stomach.
6. Give the pathology of the blood in pernicious anemia.
7. Name the chief differential points between carcinoma and sarcoma.
8. Describe a method for staining tubercle bacilli.
9. Describe methods of culture of the diphtheria bacillus.
10. What is the Widal's reaction?

NERVOUS DISEASES AND DISEASES OF THE EYE AND EAR.

1. Give diagnosis and treatment of migraine.
2. What is tic douloureux? Outline treatment.
3. Mention etiology, symptoms and treatment of sciatica.
4. Describe a case of progressive bulbar paralysis.
5. Briefly describe a case of general paresis.
6. Define: hordeolum, chalazion, ectropion, entropion, ptosis, astigmatism and myopia.
7. Give symptoms and treatment of purulent conjunctivitis.
8. Give diagnosis and treatment of mastoiditis.
9. Describe and give the treatment of pterygium.
10. Give the three most common causes of otitis media.

MATERIA MEDICA AND THERAPEUTICS.

1. Define narcotics, anesthetics and sedatives. Give an example of each.
2. Define diuretics and diaphoretics. Give three examples of each.
3. Give the therapy of phosphorus.
4. Give the physiological action of opium and name its alkaloids.
5. Name the drugs you would exhibit in pneumonia, acute interstitial nephritis, and rheumatism.
6. Mention three heart stimulants. Give the adult dose of each.
7. Write a prescription for acute bronchitis, chronic constipation and acute cystitis.
8. Classify the following drugs: aconite, atropia, pilocarpine, ergot, elaterium and manganese.
9. Name four hypnotics and give the adult dose of each. Name four emetics and give the dose of each.
10. Define an alkaloid and give an example of the same. Define serum therapy. Mention three serums, the indications for their use and state the dose of each.

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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

STATE MEDICAL EXAMINING BOARD OF WASHINGTON.

SURGERY.

1. In fracture of the neck of the femur, the head of the femur will be found in the acetabulum; in dislocation, the acetabulum will be empty, and the head of the femur will be found elsewhere, *e.g.* on the dorsum of the ilium. In the fracture, crepitus *may* be elicited; in the dislocation, never. In the dislocation, there is inversion and a fixed position of the limb, both of which are absent in fracture.

2. The knee is disinfected, then covered with antiseptic gauze, and firmly bandaged. The leg is extended on the thigh, the thigh flexed on the abdomen, a posterior splint is applied, and the foot is supported. In two or three days the bandages may be reapplied if the parts are in good condition, and a plaster-of-Paris dressing put on. The patient is then allowed to walk about; the plaster-of-Paris dressing remains on for about three weeks.

3. "When delayed union exists, seek for a cause and remove it, treating constitutionally if required, and thoroughly immobilizing the parts by plaster. Orthopedic splints may be of value. Use of the limb while splinted, percussion over the fracture, and rubbing the fragments together, thus in each case producing irritation, have all been recommended. Blistering the skin with iodine or firing it has been employed. If the case be very long delayed, forcibly separate the fragments and put up in plaster as a fresh break. If these means fail, irritate by subcutaneous drilling or scraping, or, better, by laying open the parts and then drilling and scraping at many places." (Da Costa's *Surgery*.)

5. The different varieties of aneurysm are: True; false; fusiform; sacculated; dissecting; arteriovenous, of which there are two varieties, varicose aneurysm and aneurysmal varix; cirroid, and aneurysm by anastomosis.

9. The following contraindications for ether and chloroform are from Hare's *Practical Therapeutics*: "Ether should not be used by inhalation in bronchitis or acute nephritis, because of its irritant properties; in peritonitis or gastritis, because it is apt to induce vomiting; in aneurysm or in the presence of marked vascular atheroma, because it may rupture a blood-vessel by raising arterial pressure; nor in diabetes, lest it produce diabetic coma; and if anemia is present and an examination of the blood

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shows that the hemoglobin is below 50 per cent., the use of the drug should be avoided if possible.

"*Chloroform* is not to be used in cases of fatty heart or dilatation of the heart, in those with a known idiosyncrasy, nor in the so-called lymphatic persons with overgrowth of lymphoid tissues, as, for example, adenoids. In the latter case it is particularly apt to cause sudden death. In valvular disease of the heart chloroform may be used with caution, although ether is preferable. Given a case of valvular disease that must be subjected to operation, the chances are bettered with an anesthetic than without it, as the pain and mental shock are worse for the heart than is the anesthetic."

PREVENTIVE MEDICINE AND MEDICAL JURISPRUDENCE.

1. "Idiocy differs from other states of insanity in the fact that it is marked by a congenital deficiency of the mental faculties. There is not here a perversion or a loss of what has once been acquired, but a state in which, from defective structure of the brain, the individual has never been able to acquire any degree of intellectual power to fit him for his social position. It commences with life and continues through it." (Taylor's *Medical Jurisprudence*.)

4. A wound inflicted by a blunt instrument will have somewhat of the appearance of a contused wound; the edges will not be so clean cut, and the surrounding tissues will be more or less bruised.

5. In expert testimony the witness may give his *opinion* on facts or supposed facts as noted by himself or asserted by others. *Theoretically*, this can only be done by those perfectly familiar with the subject in question; but *practically* any (or almost any) physician with a license to practice is accepted as an expert witness.

6. (a) *Diphtheria*: till the patient is free from all signs of congestion or rhinitis, and continued bacteriological examination is persistently negative.

(b) *Scarlet fever*: till the patient is quite free from sore throat or discharges of any kind, and the desquamation has entirely disappeared; generally six to eight weeks.

(c) *Smallpox*: till all crusts or scabs have entirely disappeared.

7. The portals of entry of tubercular infection are: the respiratory tract, the alimentary tract, the skin, the mucous surfaces. It may be hereditary.

8. "In pneumonia and pulmonary tuberculosis, the sputum should be received in spit-cups partly filled with disinfectant solution, and kept covered when not in actual use. It may be treated with 5 per cent. of carbolic acid,

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or about 5 per cent. of any of the cresol compounds, or 1 per cent. of formaldehyde. Milk of lime and chlorinated lime are also efficient. Corrosive sublimate is very uncertain. By reason of its consistency and adhesive properties, sputum is one of the most difficult materials to sterilize." (Harrington's *Practical Hygiene*.)

9. *Infectious* diseases are such as are due to the presence of bacteria.

Contagious diseases are such as can be communicated by contact from a person who is infected to a healthy person.

10. (a) The skin becomes pale, there are gastric disturbances, general muscular weakness, mental impairment, and lowered vitality, resulting in the taking of various diseases.

(b) In a room for continued occupancy each person should be allowed 3,000 cubic feet of fresh air per hour, or at least 1,000 cubic feet of space with ample and adequate facilities for ventilation. In a sleeping room occupied by several people each person should have at least 750 cubic feet of space, with proper ventilation. A sleeping room occupied by one person only should have from 1,200 to 1,800 cubic feet of space.

PRACTICE OF MEDICINE AND DISEASES OF CHILDREN.

1. *Chronic gastritis* is generally caused by indiscretions in diet, or by mental worry; it may occur at any time of life, and is characterized by pain in the epigastric region which generally comes on after eating; there is apt to be morning vomiting, the vomitus consisting of mucus with undigested particles of food; there is seldom hemorrhage; the stomach may be enlarged, and examination of the gastric contents shows free HCl diminished or absent, and the digestive ferments diminished.

Carcinoma of the stomach does not usually occur before forty years of age, is more common in males, the pain is localized and constant, vomiting is copious and occurs some time after eating; the vomitus contains "coffee ground" material; hemorrhages are common; a tumor may be palpated, and examination of the gastric contents shows absence of free HCl and presence of lactic acid; severe anemia and cachexia are also present.

3. *Vertigo* is a disturbance of the sense of equilibrium, a condition in which the patient or objects surrounding him appear to be in a state of rotation or oscillation. It is not a disease; but is a symptom of many pathological conditions.

The chief *varieties* are: (1) auditory, or labyrinthine,

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also called Menière's disease; (2) cerebral; (3) gastric; (4) toxic; (5) senile; (6) hysterical; (7) essential.

9. **ADENOIDS A.** *Causes:* The real cause is unknown, but the condition is generally observed in childhood; heredity is also supposed to be a factor; males are more frequently affected than females; malnutrition and scrofula seem to be causative factors; the condition is often associated with enlarged tonsils, enlarged cervical glands, hypertrophy of the nasal mucous membrane, deviations of the septum, spurs; it often follows some of the acute infectious diseases.

Symptoms: Mouth-breathing; snoring; open-mouth; a vacant, dull expression of the face; modification of the voice (nasal twang), with inability to pronounce certain letters.

Effects: Earache and other ear affections; mental deficiency; frequent attacks of coryza; nose-bleed; stunted growth; convulsions, laryngismus stridulus, and various other neuroses may also be noticed.

11. **ALOPECIA AREATA.** *Etiology:* The real cause is unknown; it has been regarded as a neurosis; as due to parasites; or as the result of malnutrition of the hair.

Symptoms: There are circumscribed round or oval patches of baldness, which may appear suddenly or gradually, generally in early adult life; the scalp appears unchanged or may be pale or hyperemic; there are no scales; occasionally the eyebrows or beard are involved.

It is distinguished from *Ringworm*, in that the latter is rare in adults, is characterized by scales in which are broken off stumps of hairs with split ends, and a microscopical examination shows the presence of the trichophyton fungus in ringworm.

13. *Stomatomycosis* is caused by a vegetable parasite, the *oidium albicans*. The *symptoms* are redness, either general or in patches; swelling of lips, gums, cheek, and tongue; fetid breath; dribbling of saliva, or the mouth is dry; tenderness, and difficulty in eating. *Treatment* consists in cleanliness, antiseptic mouth washes, tonics, stimulants, and good general hygiene.

OBSTETRICS AND DISEASES OF WOMEN.

1. By *Presentation* is meant the part of the fetus which presents at the pelvic brim; examples—vertex, breech, face,

By *Position* is meant the relation between a point on the fetus and a point on the maternal pelvis; examples, in a vertex presentation the positions may be (1) left occipito-anterior, (2) right occipito-posterior, (3) right occipito-anterior, (4) left occipito-posterior. The left occipito-anterior position of the vertex presentation is the most common.

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2. The greatest diameters of the female pelvis are the transverse at the brim and the antero-posterior at the outlet; each of which is five inches.

The greatest diameter of the fetal head is the occipito-mental, which is five and a half inches.

3. "The placenta is formed by the union of the chorion frondosum and the decidua serotina, and therefore is composed of fetal and maternal tissues. In the third or fourth month of pregnancy it constitutes a distinct structure, although its site is indicated at a much earlier period by the increased thickness of the chorion at that point." (Williams' *Obstetrics*.)

6. "When extrauterine pregnancy exists there are: (1) The general and reflex symptoms of pregnancy; they have often come on after an uncertain period of sterility. Nausea and vomiting appear aggravated. (2) Then comes a disordered menstruation, especially metrorrhagia, accompanied with gushes of blood, and with pelvic pain coincident with the above symptoms of pregnancy. Pains are often very severe, with marked tenderness within the pelvis. Such symptoms are highly suggestive. (3) There is the presence of a pelvic tumor characterized as a tense cyst, sensitive to the touch, actively pulsating. This tumor has a steady and progressive growth. In the first two months it has the size of a pigeon's egg; in the third month it has the size of a hen's egg; in the fourth month it has the size of two fists. (4) The os uteri is patulous; the uterus is displaced, but is slightly enlarged and empty. (5) Symptoms No. 2 may be absent until the end of the third month, when suddenly they become severe, with spasmodic pains, followed by the general symptoms of collapse. (6) Expulsion of the decidua, in part or whole. Nos. 1 and 2 are *presumptive signs*; Nos. 3 and 4 are *probable signs*; Nos. 5 and 6 are *positive signs*." (*American Text-Book of Obstetrics*.)

7. Subinvolution of the uterus is commonly caused by: Lacerations of the cervix; absorption of septic products; mismanagement of the convalescent stage of the puerperium, chiefly too early rising; tedious labors; misplacement of the uterus; retained clots or membranes; tumors of the uterus.

8. *Metrorrhagia* is a uterine hemorrhage independent of menstruation.

Two of its most common causes prior to the menopause are uterine displacements and tumors (chiefly fibroids and polypi).

Occurring subsequent to the menopause, cancer would be suspected.

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This suspicion would be verified by a microscopic examination of a piece of tissue excised from the cervix.

10. Two indications for hysterectomy: Carcinoma and fibroids.

As to preference between the vaginal and abdominal routes, the following is taken from Garrigues' *Gynecology*: "If the vaginal route is available, it should be preferred, because it entails much less shock, requires a simple after-treatment, does not leave any visible cicatrix, predisposes less to hernia, and allows the patient to resume work in shorter time. On the other hand, the vaginal route is more difficult on account of the limited space. Hemorrhage is more troublesome to check, adhesions are harder to separate, and the bladder and intestine more exposed to injury and less accessible for repair. The pelvic cavity cannot be seen so well and the abdominal not at all. If tissue is left to mortify, it emits an offensive odor."

CHEMISTRY AND TOXICOLOGY.

1. Antidote for arsenic is freshly prepared ferric hydroxide. Arsenic acts as an irritant on the gastrointestinal canal and then causes inflammation.

On the nervous system it probably acts as a stimulant, if given in medicinal doses; in toxic doses it may cause paralysis. The local condition that may be found upon the hands of arsenic workers is as follows: If the epidermis is unbroken an eruption may appear, if the epidermis is broken the arsenic has a caustic and destructive effect; ulceration around the nails and shedding of the nails may also occur.

2. The chemical antidotes to carbolic acid are the soluble sulphates, such as magnesium or sodium sulphate. With the carbolic acid these salts form insoluble sulphocarbolates. Before death carbolic acid poisoning can be diagnosed by the hoarseness of the voice, in addition to all the other signs of corrosion, such as eschars on mucous membrane of mouth, vomiting, purging, abdominal pain, cold, perspiration, pinched and anxious face, collapse, etc.

3. The *symptoms* of chronic lead poisoning are: Wrist drop, severe colic around the umbilicus, constipation, feces clay colored, blue line on the gums at the junction with the teeth.

The treatment is first to remove the cause; then administer a purge of jalap and calomel combined with opium; iodide of potassium should also be given to help in the elimination of the lead.

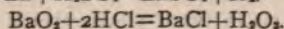
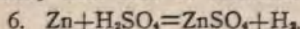
4. The treatment of phosphorus poisoning is to administer first an emetic, then old French oil of turpentine,

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or solution of potassium permanganate, and avoid giving any oils or fat with the food.

5. The *symptoms* of nitrate of silver poisoning are: "Almost immediately after the ingestion of a poisonous dose of nitrate of silver violent pain in the belly, with vomiting and purging, comes on. At the same time evidences of widespread gastroenteritis develop. The abdominal walls are knotted and hard, and perhaps scaphoid. The face is anxious and livid and covered with a sweat. When the vomiting occurs the ejecta are seen to be brown or blackish, or even white and curdy. The lips are stained white, but they rapidly become brown, then black. In some cases the nervous symptoms are severe and convulsions with delirium may occur. The convulsions are epileptiform. Death ensues either from gastroenteritis or from centric respiratory failure, accompanied by a profuse exudation of liquid mucus into the bronchial tubes.

"The *treatment* consists in the use of common salt, which is the chemical antidote, the employment of opium and oils to allay irritation, and in the ingestion of large draughts of milk and of soap and water for the purpose of diluting the poison and protecting the mucous membranes of the esophagus and stomach from the action of the irritant. The bodily heat must be maintained." (*Hare's Therapeutics.*)



7. An *atom* is the smallest portion of an element that can enter into a chemical reaction, or that can enter into the composition of a molecule.

A *molecule* is the smallest quantity of any substance that can exist in a free state.

8. *Isomeric compounds* are compounds which, while differing in properties, possess the same percentage composition.

9. Moisten the substance with HNO_3 and evaporate; then let it cool, and add a little NH_4HO ; a brilliant red color is produced.

10. Method for the *quantitative estimation of sugar in urine*: "*Fehling's method.*"—The solution is made as follows:

I. Dissolve cupric sulphate	51.98 gm.
in water to	500.00 c.c.
II. Dissolve Rochelle salt	259.9 gm.
in sodium hydroxide soln. sp. gr. 1.12 to 1,000 c.c.	(Piffard).

When required for use, one volume of I. is to be mixed with two volumes of II. The copper contained in 10 c.c.

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of this mixture is precipitated completely, as cuprous oxid, by 0.05 gm. of glucose.

"To determine the quantity of sugar, place 10 c.c. of the mixed soln. in a flask of about 250 c.c. capacity, dilute with H_2O to about 30 c.c., and heat to boiling. On the other hand, the urine to be tested is diluted and thoroughly mixed with four volumes of H_2O if it be poor in sugar, or with nine volumes of H_2O if highly saccharine, and a burette filled with the mixture. When the Fehling soln. boils, add a few gtt. NH_4HO and then 5 c.c. of the urine from the burette, boil again, and continue the alternate addition of diluted urine and boiling of the mixture until the blue color is quite faint. Now add the diluted urine in quantities of 1 c.c. at a time, boiling after each addition until the blue color just disappears. Have ready a small filter, and, having filtered through it a few gtt. of the hot mixture, acidulate the filtrate with acetic acid, and add to it 1 gtt. soln. of potassium ferrocyanide. If a brownish tinge be produced, add another $\frac{1}{2}$ c.c. of dil. urine to the flask, boil, and test with ferrocyanide as before. Continue this proceeding until no brown tinge is produced. The burette reading, taken at this point, gives the number of c.c. of dilute urine containing 0.05 gm. glucose, and this divided by 5 or 10, according as the urine was diluted with 4 or 9 volumes of H_2O , gives the number of c.c. of urine containing 0.05 gm. sugar. The number of c.c. urine passed in twenty-four hours divided by 20 times the number of c.c. containing 0.05 gm. glucose, gives the elimination of glucose in twenty-four hours in grams.

<i>Example.</i>	Urine in 24 hours	= 2,436 c.c.
	Fehling's soln. used	= 10 c.c.
	Urine diluted with 4 vols. H_2O .	
	Burette reading	= 18.5 c.c.

18.5

— = 3.7 = c.c. urine containing 0.05 gm. glucose.

5

2,436

— = 32.92 = grams glucose eliminated in 24 hours."

3.7 × 20

(Witthaus' *Urinalysis*.)

ANATOMY AND PHYSIOLOGY.

9. The venous blood current is maintained by (1) the action of the heart, (2) muscular contraction, and (3) aspiration of the thorax.

The pulmonary arteries carry venous blood.

10. The causes producing the *first* sound of the heart are not definitely ascertained; the following are supposed to be causatory factors: (1) The vibration and closure of

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the auriculo-ventricular valves, (2) the muscular sound produced by the contraction of the ventricles, and (3) the cardiac impulse against the chest wall.

The *second* sound is caused by the vibration due to the closure of the semilunar valves.

11. The *amount* of bile secreted in twenty-four hours varies from about 500 c.c. to 900 c.c.

The *composition* of the bile may be shown in the following table, which presents the averages of three analyses given by Hammarsten; the results are given in parts per thousand:

Water	971.380
Solids	28.620
Mucin and pigments.....	4.910
Bile salts.....	12.197
Taurocholate	2.431
Glycocholate	9.766
Fatty acids from soaps.....	1.200
Cholesterin	1.243
Lecithin and fats.....	0.970
Soluble salts	7.360
Insoluble salts	0.317

The *functions* of the bile are: (1) to assist in the emulsification and saponification of fats; (2) to aid in the absorption of fats; (3) to stimulate the cells of the intestine to increased secretory activity, and so promote peristalsis, and at the same time tend to keep the feces moist; (4) to eliminate waste products of metabolism, such as lecithin and cholesterin; (5) it has a slight action in converting starch into sugar; (6) it neutralizes the acid chyme from the stomach, and thus inhibits peptic digestion; (7) it has a very feeble antiseptic action.

13. The glands of the small intestine are: (1) Glands of Lieberkühn, (2) glands of Brunner, (3) Peyer's patches.

The function of these glands is to contribute towards the composition of the succus entericus.

14. "*Mechanism of Accommodation.*—The lens is an elastic structure, and when released from the flattening influence of its suspensory ligament tends to assume a spherical shape. During accommodation the ciliary muscle (especially the circular fibers) contracts, drawing forward the chorioid and relaxing the suspensory ligament; this diminishes the tension of the lens capsule and allows the inherent elasticity of the lens to increase its convexity. The change in curvature affects chiefly the anterior surface of the lens. This is Helmholtz's theory and the one usually accepted. Lately Tscherning has advanced a different theory; he maintains that the ciliary muscle in-

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creases the tension of the suspensory ligament during contraction and that this causes peripheral flattening of the lens with bulging anteriorly at its center. The act of accommodation is accompanied by contraction of the pupil, and (in binocular vision) by convergence of the visual lines." (*May's Diseases of the Eye.*)

HISTOLOGY, PATHOLOGY, AND BACTERIOLOGY.

2. The layers of mucous membrane are: (1) Epithelium, (2) basement membrane, (3) fibrous and elastic connective tissue, (4) sometimes involuntary muscular tissue.

Mucous membranes are found lining all passages which connect the interior of the body with the surface. The principal ones are the gastrointestinal tract, the pulmonary tract, and the genitourinary tract.

5. Peptic ulcer of the stomach is usually situated on the posterior wall and lesser curvature, near the pyloric orifice; it is generally small and round or oval; clean punched out, and with sloping edges, giving a funnel shaped appearance with the apex outward; the edges and floor are generally pale and smooth. These ulcers may be single or multiple, and are liable to terminate in hemorrhage and perforation.

6. In *pernicious anemia* the blood would show: (1) A diminution in the number of red corpuscles; (2) a relative increase in the amount of hemoglobin; (3) poikilocytosis; (4) the presence of nucleated red cells; (5) variation in the size of the red cells; (6) the leucocytes *may* be diminished.

7. *Carcinoma* is apt to occur at a later age; is found in structures derived from the epiblast or hypoblast; possesses a fibrous stroma, in which are found both blood-vessels and lymphatics; metastasis is by the lymphatics.

Sarcoma is apt to occur earlier; is found in structures derived from the mesoblast; there is no stroma between the cells; the blood-vessels are in direct contact with the tumor cells; there are no lymphatics; metastasis is by the blood-vessels.

8. The sputum must be recent, free from particles of food or other foreign matter; select a cheesy-looking nodule and smear it on a slide, making the smear as thin as possible. Then cover it with some carbolfuchsin, and let it steam over a small flame for about two minutes, care being taken that it does not boil. Wash it thoroughly in water and then decolorize by immersing it in a solution of any dilute mineral acid for about a minute. Then make a contrast stain with solution of Loeffler's methylene blue for about a minute; wash it again and examine with oil immer-

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sion lens. The tubercle bacilli will appear as thin red rods, while all other bacteria will appear blue.

10. The Widal serum reaction "depends upon the fact that serum from the blood of one ill with typhoid fever, mixed with a recent culture, will cause the typhoid bacilli to lose their motility and gather in groups, the whole called "clumping." Three drops of blood are taken from the well-washed aseptic finger tip or lobe of the ear, and each lies by itself on a sterile slide, passed through a flame and cooled just before use; this slide may be wrapped in cotton and transported for examination at the laboratory. Here one drop is mixed with a large drop of sterile water, to redissolve it. A drop from the summit of this is then mixed with six drops of fresh broth culture of the bacillus (not over twenty-four hours old) on a sterile slide. From this a small drop of mingled culture and blood is placed in the middle of a sterile cover-glass, and this is inverted over a sterile hollow-ground slide and examined. A positive reaction is obtained when all the bacilli present gather in one or two masses or clumps, and cease their rapid movement inside of twenty minutes." (From Thayer's *Pathology*.)

NERVOUS DISEASES AND DISEASES OF THE EYE AND EAR.

6. *Hordeolum* is an abscess or inflammation in the tissues about the follicle of an eyelash.

Chalazion is a tumor in the eyelids due to obstruction of the duct in a Meibornian gland.

Ectropion is an eversion of the eyelid with exposure of conjunctival surface.

Entropion is an inversion of the margin of the eyelid and eyelashes.

Ptoxis is a drooping of the upper eyelid, generally due to paralysis.

Astigmatism is a condition in which owing to a greater curvature of the eye in one meridian than in others, the refractive power of the eye varies.

Myopia is a condition in which the antero-posterior axis of the eye is abnormally long, and parallel rays are focused in front of the retina.

10. (1) Catarrhal conditions of the nose and throat, (2) infection from the external ear, Eustachian tube, or elsewhere, (3) traumatism.

MATERIA MEDICA AND THERAPEUTICS.

1. *Narcotics* are agents that produce sleep or stupor and allay pain. Example—opium.

Anesthetics are agents which destroy sensation for a period of time. Example—chloroform.

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Sedatives are agents which allay excitement and functional activity, and sometimes tend to diminish pain. Example—potassium bromide.

2. *Diuretics* are agents which promote the secretion of urine. Examples—water, alcohol, potassium acetate.

Diaphoretics are agents which promote the secretion of sweat and increase the activity of the skin. Examples—alcohol, Dover's powder, Turkish bath.

6. *Three heart stimulants*: (1) Alcohol, dose $\mathfrak{z}\text{j}$ to $\mathfrak{z}\text{ij}$ of spiritus frumenti, diluted; (2) ammonia, dose of aqua ammoniæ, $\mathfrak{m}\text{xv}$ to xx , well diluted; (3) sparteine sulphate, dose gr. $\frac{1}{16}$ to $\frac{1}{4}$.

7. For *acute bronchitis*:

℞. Vini ipecacuanhæ..... $\mathfrak{z}\text{ij}$
Liquoris potassii citratis..... $\mathfrak{z}\text{iv}$
Tincturæ opii camphoratæ
Syrupi acaciæ.....aa $\mathfrak{z}\text{j}$ Misce.

Sig:—One tablespoonful three times a day.

For *chronic constipation*:

℞. Aloingr. vj
Atropinæ sulphatisgr. $\frac{1}{4}$
Strychninæ sulphatisgr. j . Misce.

Fiat massa in pilulas no. xxx dividenda.

Sig:—One pill two or three times a day.

For *acute cystitis*:

℞. Potassii acetatis
Potassii citratisaa $\mathfrak{z}\text{ij}$
Aquæ destillatæ.....q.s. and $\mathfrak{z}\text{vj}$ Misce.

Sig:—One tablespoonful three times a day.

9. *Four hypnotics*:—(1) chloral hydrate; dose, gr. xv to xx . (2) Sulphonal; dose, gr. xv to xxv . (3) Trional; dose, gr. xv to xxv . (4) Paraldehyde; dose, $\mathfrak{m}\text{xxx}$ to $\mathfrak{z}\text{i}$.

Four emetics:—(1) Apomorphine hydrochloride; dose, gr. $\frac{1}{10}$ hypodermically. (2) Copper sulphate; dose, gr. iv to vj in water. (3) Zinc sulphate; dose, gr. x to xv in water. (4) Turpeth mineral; dose, gr. iij to v .

10. *Alkaloids* are active nitrogenous principles, alkaline in reaction, and capable of uniting with acids to form salts in the same way that ammonia does. Example—strychnine.

"*Serum therapy* proper is the prophylactic and curative treatment of certain infectious diseases by the subcutaneous or intravenous administration of a blood-serum containing an antibody which is specific to the particular disease." (Potter's *Materia Medica*.)

Examples:—(1) Diphtheria antitoxin; dose, 3,000 units;

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immunizing dose, 500 units; indicated in diphtheria. (2) Antitetanic serum; dose 3ijss to v; indicated in tetanus. (3) Antivenomous serum; dose, 3ijss to viij; indicated in snake bite.

STATE BOARD EXAMINATION QUESTIONS.

WEST VIRGINIA STATE BOARD OF HEALTH.

ANATOMY AND EMBRYOLOGY.

1. What is the skin? Name and describe its layers, what are its appendages, and where found?
2. Describe the mastoid portion of the temporal bone, and name the muscles attached thereto.
3. Describe the iris, giving its blood and nerve supply.
4. Locate the liver, give its average weight, blood supply, and describe its ligaments.
5. Name the regions of the abdomen. What parts are included in each region?
6. Give the rise, course, and general distribution of the femoral artery.
7. What changes take place in the vascular system at birth?
8. Describe in detail the long saphenous vein, and give the surface markings.
9. Define the term osteoblast, myoblast, sequestrum. Explain sequestrum formation.
10. Describe the musculospiral nerve.

PHYSIOLOGY AND HISTOLOGY.

1. Describe yellow elastic tissue.
2. Describe nerve vesicle, nerve fiber, neuron.
3. What is reflex action? Give example.
4. What changes in brain during sleep?
5. What is the blood composition; blood pressure, to what due?
6. Give process of respiration, to what due, when mostly pectoral, when mostly abdominal?
7. Give normal amount of urine in twenty-four hours, its composition, how much urea?
8. Describe the skin, give its office.
9. Explain the difference between tonic and clonic spasm.
10. Locate the speech center, what may cause aphasia?

MATERIA MEDICA AND THERAPEUTICS.

1. Belladonna: preparations, action, therapeutics.
2. Salicylate: origin, action, uses.

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3. Define a diuretic, give an example and explain its physiological action.
4. Name eight anthelmintics.
5. Nux vomica: preparations, therapeutic action.
6. Physiological action of cocaine; treat poisoning. What is cumulative action of a drug? Give example.
7. What is Fowler's solution, Dover's powder, Basham's mixture?
8. Name three direct cholagogues, three indirect cholagogues.
9. Therapeutic value of alcohol.
10. Classify arsenic, chloral, phosphorus, iodine, turpentine, quinine.

CHEMISTRY AND MEDICAL JURISPRUDENCE.

1. Define base, acid, atom, and element.
2. Define analysis, synthesis, reaction, and sublimation.
3. What is normal reaction of urine and what caused by, and how modify abnormal reaction?
4. Give chemical difference between inspired and expired air and what effect on blood?
5. Give characteristics of diabetic urine, cystitic urine.
6. What are incompatibilities? Show by formulæ.
7. What is cause of pain in bite of insect? What local antidote and why?
8. Give steps and findings in a post-mortem investigation of death from asphyxiation.
9. What is the danger of eating peach kernel? Is there any antidote?
10. Give formula for lime water and show reaction when taken into stomach.

BACTERIOLOGY AND HYGIENE.

1. What is cretinism, and with what is it associated?
2. Describe the formation of adipose tissue.
3. Mention the malignant neoplasms.
4. Describe the microscopic appearance of acute parenchymatous nephritis and explain the origin of blood in the hemorrhagic form.
5. Is cerebrospinal fever more generally sporadic or endemic?
6. What habits of school children tend to produce myopia?
7. Indicate a proper diet in the case of diabetes mellitus, obesity, and early convalescence in typhoid fever.
8. Name eight principal carbohydrates used in food.
9. Name three tests of detecting impurities in water.

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10. What is meant by natural and acquired immunity from disease? Give an example of each.

PRACTICE OF MEDICINE AND PEDIATRICS.

1. Give cause, symptoms, and treatment of chronic gastric catarrh.

2. Give seat of lesion and symptoms of locomotor ataxia.

3. Diagnose and treat acute articular rheumatism. What are the most dangerous complications?

4. Give cause and treatment of constipation.

5. Diagnose the skin and mucous membrane manifestations of syphilis.

6. Give symptoms and treatment of the following poisons: lead, strychnine, aconite, and carbolic acid.

7. Diagnose and treat ulcerative stomatitis.

8. What instructions would you give the nurse in regard to the care and feeding of a child during the first month?

9. Differentiate epilepsy from other convulsive diseases of children.

10. Give cause, symptoms and treatment of acute meningitis.

OBSTETRICS AND GYNECOLOGY.

1. How is the pelvis formed?

2. Describe the Fallopian tubes.

3. Give theory of menstruation.

4. What is the appearance, weight, etc., of a fetus of the fifth month?

5. How many stages of labor? Describe each.

6. What articles should be taken by the accoucheur to the bedside?

7. What is the most frequent cause of pyosalpinx? Treatment.

8. Treat eclampsia.

9. What preventive measures, if any, would you take to prevent ophthalmia neonatorum?

10. Diagnose and treat a transverse position.

SURGERY.

1. Differentiate varicocele, hydrocele, cystocele, rectocele, and hematocele. Give treatment for each.

2. Give indications, steps and technique of operation for phimosis.

3. Give surgical treatment for varicose veins of leg.

4. Give operation of tracheotomy, naming indications.

5. Define carbuncle and give treatment, local and systemic.

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6. Give symptoms of intussusception, treatment, and prognosis.
7. Give etiology, symptomatology, and treat the different forms of erysipelas.
8. Define, give cause and treatment of Colles' fracture.
9. Describe operation for infusing a patient with normal salt solution.
10. Differentiate fistula and fissure of anus, and give treatment of each.

SPECIAL PRACTICE.

1. What should be included in the history of case?
 2. Differentiate between appendicitis and biliary colic.
 3. Describe some of the conditions which cause children to sleep with mouth open.
 4. Aphonia: is it a disease or symptom of diseased condition? Give causes.
 5. Iritis: describe and treat.
 6. Describe albuminuric retinitis, its significance.
 7. Eyestrain: what are some of the symptoms?
 8. Name some of the causes of impaired hearing, and how tested.
 9. Describe the so-called "S. Weir Mitchell rest cure."
 10. Acute mania: give symptoms.
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ANSWERS TO STATE BOARD EXAMINATION QUESTIONS.

WEST VIRGINIA STATE BOARD OF HEALTH.

PHYSIOLOGY AND HISTOLOGY.

3. *Reflex actions* are involuntary or unconscious movements, due to suitable stimuli. They depend upon the integrity of the *reflex arc*, which is a complex made up of: (1) A surface capable of receiving an impression; (2) an afferent nerve; (3) a nerve cell capable of receiving and also of sending out impulses; (4) an efferent nerve, and (5) a surface capable of responding in some way to the impulse conveyed by the efferent nerve.

Example: The patellar reflex consists of a contraction of the extensor muscles of the leg and a movement of the foot forward when the ligamentum patellæ is struck; the quadriceps extensor must first be slightly stretched by putting one knee over the other. Its integrity depends upon a healthy condition of the entire reflex arc, consisting of tendon, afferent or sensory nerve, posterior

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roots, and anterior horn of the spinal cord, the efferent or motor nerve, and the muscle itself.

4. During sleep the brain receives less blood and fewer stimuli; the cortical centers are dulled.

5. The blood is composed of:

1. Plasma.

2. Corpuscles. $\left\{ \begin{array}{l} \text{Colored.} \\ \text{Colorless.} \\ \text{Blood-plates.} \end{array} \right.$

The *plasma* consists of water and solids (proteids, extractives, and inorganic salts). The *red corpuscles* consist of water and solids (hemoglobin, proteids, fat, and inorganic salts). The *white corpuscles* consist of water and solids (proteid, leuconuclein, lecithin, histon, etc.).

7. The normal amount of urine passed by an adult in twenty-four hours is about fifty ounces.

The normal constituents of the urine are: Water, urea, uric acid, urates, hippuric acid, kreatinin, xanthin, hypoxanthin; sulphates, chlorides, and phosphates of sodium and potassium; phosphates of magnesium and calcium; nitrogen, and carbon dioxide.

The amount of urea voided in twenty-four hours is about five hundred grains.

8. The *functions of the skin* are: Protection, excretion, secretion, regulation of the body temperature, absorption, sensation, special sense of touch, respiration.

9. In *tonic spasms* the muscle remains for some time in a state of rigid contraction. In *clonic spasms* the muscle alternately contracts and relaxes.

10. The speech center is located in the third frontal convolution, on the left side.

Aphasia may be caused by: Cerebral hemorrhage, thrombosis or embolism; by tumor, or abscess in the neighborhood of the center.

MATERIA MEDICA AND THERAPEUTICS.

3. A *diuretic* is an agent which promotes the secretion of urine. Caffeine is a diuretic; it acts by dilating the renal blood-vessels, chiefly in the glomeruli, it stimulates the secretory epithelium of the kidneys, and also hinders absorbent action in the uriniferous tubules.

4. *Eight anthelmintics*: Santonin, pomegranate, pepo, aspidium, pelletierine, spigelia, quassia, turpentine.

5. *Nux Vomica*. *Preparations*: Extract, fluid extract, and tincture of nux vomica; strychnine, sulphate and nitrate of strychnine.

Physical action: It excites the digestive secretions, increases the appetite, increases peristalsis, and improves the digestion; it is a vasoconstrictor, it raises blood pres-

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sure, and is a cardiac stimulant; it is also a respiratory stimulant; hearing and sight are rendered more acute.

6. COCAINE. *Physiological action:* Local anesthetic, when applied externally; internally, it is a muscular, cerebral, circulatory, and respiratory stimulant, and a mydriatic.

Treatment of cocaine poisoning: Wash out the stomach; give nitroglycerin, amyl nitrite, strychnine, or ammonia; artificial respiration may be necessary.

When a drug is administered for a sufficient time more rapidly than it can be eliminated, a time will come when it will have *accumulated* to such a degree that marked, and possibly toxic, effects will be produced by ordinary medicinal doses.

7. Fowler's solution is *Liquor potassii arsenitis*.

Dover's powder is *Pulvis opii et ipecacuanhæ*.

Basham's mixture is *Liquor ferri et ammonii acetatis*.

8. Three *direct cholagogues:* *Euonymus*, *podophyllin*, *sodium phosphate*.

Three *indirect cholagogues:* *Mercury*, *potassium bitartrate*, *jalap*.

9. "Though decidedly injurious in health, in disease alcohol is a most valuable remedy in appropriate cases. In *vomiting* of yellow fever, seasickness, etc., iced champagne is useful. *Atonic indigestion* of nervous and depressed subjects, cautiously. *Phthisis*, it does good if it promotes digestion and assimilation; otherwise it is very injurious. *Cholera infantum*, *diarrhea*, etc., Cognac brandy in full doses. *Cardiac failure*, brandy in small doses repeated as fast as oxidized. *Chloroform anesthesia*, $\frac{3}{4}$ j-ij of whiskey beforehand, to sustain the heart, and prolong the chloroform narcosis. *Poisoning* by cardiac depressants and snake venom, alcohol freely, to sustain the heart. In *snake poisoning* it is given *ad libitum*. *Diphtheria*, whiskey or brandy in small doses frequently from the commencement, and dilute alcohol sprayed into the throat, is very efficient treatment. *Adynamic fevers*, small doses frequently are often of great value. *Genorrhæa*, Niemeyer is said to have done a lucrative business by treating this affection with injections of tannic acid in port wine. *Insomnia* from cerebral anemia may be prevented by small doses of some alcoholic stimulant at bedtime. *Wounds*, no better dressing than strong alcohol, to prevent putrefaction and protect the surface by coating it with a coagulum of its own albumin. *Bed sores* if threatening, alcohol locally, to harden the tissue. *Cold* from exposure, may be prevented by a moderate dose of alcohol, to restore the balance of the circulation and pre-

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vent internal congestion, by relaxing the vessels of the periphery."—(Potter's *Materia Medica*.)

Example: Digitalis, strychnine.

CHEMISTRY AND MEDICAL JURISPRUDENCE.

1. *A base* is a ternary compound capable of entering into double decomposition with an acid to produce a salt and water.

An acid is a compound of an electro-negative element or radical with hydrogen, part or all of which hydrogen it can part with in exchange for an electro-positive element or radical, without the formation of a base.

An atom is the smallest quantity of an element that can enter into chemical action, or that can enter into the composition of a molecule.

An element is a substance which cannot, by any known means, be split up into any two or more other kinds of substance.

2. *Analysis* is the splitting up of a compound into simpler compounds or elements.

Synthesis is the formation of compounds from elements or from simpler compounds.

Reaction is (1) the action of substances upon certain organic pigments; (2) the mutual chemical action of two or more substances on each other.

Sublimation is the process of converting a solid into a vapor, by heat.

3. The normal reaction of urine is acid; this is due chiefly to the acid sodium phosphate (monosodic phosphate) and acid potassium phosphate (monopotassic phosphate). When the urine is alkaline, benzoic acid may be administered to render it acid.

4. The changes produced in the *air* by respiration are:

	Inspired Air.	Expired Air.
Oxygen.....	21 per cent.	16.6 per cent.
Nitrogen.....	79 per cent.	79 per cent.
Carbon dioxide...	0.04 per cent.	4.4 per cent.
Other gases.....	Rare.	Often present.
Watery vapor.....	Variable.	Saturated.
Temperature.....	Variable.	That of body.
Volume.....	Varies.	Diminished.
Bacteria.....	Always present.	None.
Dust.....	Always present.	None.

In the *blood* the changes take place in the capillaries of the lungs, and are: (1) The giving up of the CO₂ by the venous blood, (2) the absorption of oxygen during in-

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spiration, (3) the blood is cooled, and (4) it also loses a small amount of watery vapor.

5. *Diabetic urine.* In diabetes mellitus the urine is enormously increased in quantity, the specific gravity is generally high (1030 to 1045), it contains sugar, has a sweetish odor, is pale in color, and has an increased amount of urea.

Cystitic urine contains pus, albumin, epithelium, triple phosphates, sometimes blood. In acute cases the urine is acid; in chronic cases it is alkaline and ammoniacal.

6. *Physical incompatibility* occurs when a prescription contains drugs which do not act chemically on one another, and so cannot be dispensed without some alteration. *Example:* prescribing an oil and water.

Chemical incompatibility occurs when chemical action not intended by the prescriber takes place between two or more of the ingredients of the prescription. *Example:* prescribing potassium chlorate to be rubbed up with tannic acid.

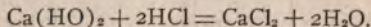
7. The pain in insect bite is supposed to be due to the presence of formic acid. The local antidote is ammonia water, or dilute alkaline liquid, either of which will neutralize the acid.

8. In death from asphyxiation there will be found:—The right side of the heart and the venous system full of blood; congestion of the mucous membrane of the bronchial tubes; the sinuses of the brain are filled with blood; the brain, liver, spleen, and kidneys will be congested; the blood is usually dark colored.

9. The danger of eating peach kernels is the possibility of being poisoned by hydrocyanic acid.

Potassium permanganate and hydrogen dioxide are said to be antidotes.

10. Lime water is a saturated aqueous solution of calcium hydroxide $\text{Ca}(\text{HO})_2$. The reaction when taken into the stomach is:



BACTERIOLOGY AND HYGIENE.

1. *Cretinism* is a condition of idiocy, associated with imperfect development of the body. It is probably due to some interference with the function of the thyroid gland.

3. The *malignant neoplasms* are: Sarcoma, epithelioma, and carcinoma.

5. Cerebrospinal fever is more generally sporadic.

6. The habits of school children which tend to produce myopia, are: Reading of poor print, or in a poor

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light, improper positions in reading or writing, using the eyes when tired, and excessive study.

8. *Eight Carbohydrates used as food:* Sugar, fruits, milk, cereals, malt, bread, green vegetables, sweets.

10. *Immunity* is the power of resistance of cells and tissues to the action of pathogenic bacteria. Immunity may be either natural or acquired.

Natural Immunity is this power of resistance, natural and inherited, and peculiar to certain groups of animals, but common to every individual of these groups.

Acquired Immunity is this resistance acquired: (1) by a previous attack of the disease caused by the bacteria, or (2) by the person being made artificially insusceptible. The conditions which give immunity from the pathogenic action of bacteria are:—(1) a previous attack of the disease; (2) inoculation, with small quantities of bacteria, so as to produce a mild attack of the disease; (3) vaccination; (4) the introduction of antitoxins; (5) the introduction of the toxins of the bacteria.

PRACTICE OF MEDICINE AND PEDIATRICS.

2. *LOCOMOTOR ATAXIA. Seat of Lesion:* Posterior columns of the spinal cord and posterior nerve roots.

Symptoms: Loss of coordination; characteristic and unsteady gait; tendency to stagger when standing up with feet together and eyes closed; sharp and paroxysmal pain, called *crises*; girdle sensation; loss of knee-jerk and other reflexes; Argyll-Robertson pupil.

3. The most dangerous complications of acute articular rheumatism are: Hyperpyrexia, endocarditis, pericarditis, chorea, myocarditis, pneumonia, delirium, coma, convulsions.

4. *Cause of constipation:* Sedentary habits, improper food, fevers, weakened abdominal muscles, pain of fissure or piles, anemia, disease of the digestive tract, jaundice, hysteria, and intestinal obstruction.

Treatment: Removal of the cause, if possible; regularity of attempts at stool; exercise, abdominal massage, laxative articles of food, water drinking, salines and mild laxatives, enema of soap and water. Cathartics should be avoided if possible.

6. *The symptoms of poisoning by lead* are: "Metallic taste; dryness of the throat; thirst; severe colicky abdominal pains, referred particularly to the umbilical region, and relieved by pressure; pulse very feeble and slow; great prostration; constipation; urine scanty and red; violent cramps; paralysis of the lower extremities; convulsions, and tetanic spasms."

The *treatment* consists in removing the cause and ad-

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ministering the antidote, "magnesium sulphate, which brings about the formation of the insoluble lead sulphate, while the purgative action of the magnesia is also useful. It should be preceded by an emetic or by the use of the stomach tube."

The *symptoms of poisoning by strychnine* are as follows: "Strychnine produces a sense of suffocation, thirst, tetanic spasms, usually opisthotonos, sometimes emprosthotonos, occasionally vomiting, contraction of the pupils during the spasms, and death, either by asphyxia during a paroxysm, or by exhaustion during a remission. The symptoms appear in from a few minutes to an hour after taking the poison, usually in less than twenty minutes; and death in from five minutes to six hours, usually within two hours."

Treatment: "The convulsions are to be arrested or mitigated by bringing the patient under the influence of chloral or chloroform as rapidly as possible; the stomach is to be washed out, and the patient is to be kept as quiet as possible."

"The *symptoms of poisoning by aconite* usually manifest themselves within a few minutes; sometimes are delayed for an hour. There is numbness and tingling, first of the mouth and fauces, later becoming general. There is a sense of dryness and of constriction in the throat. Persistent vomiting usually occurs, but is absent in some cases. There is diminished sensibility, with numbness, great muscular feebleness, giddiness, loss of speech, irregularity and failure of the heart's action. Death may result from shock if a large dose of the alkaloid be taken, but more usually it is by syncope."

"The *treatment* should be directed to the removal of the unabsorbed poison by the stomach tube, and washing out of the stomach with infusion of tea holding powdered charcoal in suspension. Stimulants should be freely administered."

Symptoms in carbolic acid poisoning: Buccal mucous membrane is whitened and hardened; vomiting; burning pain in mouth, esophagus, and stomach; pulse and body temperature are lowered; the pupils are contracted; collapse, and finally death. The urine may become dark.

Treatment: Emetics, white of egg, soluble phosphates, and stimulants. Alcohol is said to be antidotal.—*Witt-haus' Essentials of Chemistry.*

9. *Epilepsy* is characterized by the cry, tonic convulsions, sudden loss of consciousness, dilated pupils, the biting of the tongue, and the emptying of the bladder.

In *syncope* there are no twitchings and the insensibility is not complete; the condition is preceded by faintness, which is absent in epilepsy.

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In *hysteria* the tongue is not bitten, the pupils are not dilated, and the child does not hurt himself in any way.

OBSTETRICS AND GYNECOLOGY.

4. At the fifth month the fetus weighs about eight to ten ounces, and is about nine or ten inches in length. The head is about one-third of the total length; and the liver, heart, and kidneys are disproportionately large; vernix caseosa is present; lanugo, hair, and nails also appear.

6. The following articles should be taken by the accoucheur to a confinement: Tablets of bichloride of mercury, or some other material for making antiseptic solution; forceps; ether or chloroform, with inhaler or mask; fluid extract of ergot; hypodermic syringe, with tablets of strychnine, morphine, etc.; needles, sutures, and needle holder; nail brush and nail cleaner; umbilical scissors; carbolyzed vaseline; stethoscope; male catheter (rubber); a one per cent. solution of nitrate of silver.

7. The most frequent cause of pyosalpinx is gonorrhea.

8. **ECLAMPSIA.**—The line of *treatment* as laid down by Edgar is as follows: For *preventive treatment*: (1) The amount of nitrogenous food should be diminished to a minimum; (2) the production and absorption of poisonous materials in the intestines and body tissues should be limited and their elimination should be aided by improving the action of the bowels, the kidneys, the liver, the skin, and the lungs; (3) the source of the fetal metabolic products and the peripheral irritation in the uterus should, if necessary, be removed by evacuating that organ.

The *curative treatment* includes: (1) Controlling the convulsions (by chloroform, veratrum, or chloral); (2) elimination of the poison or poisons which are presumed to cause the convulsions; (3) emptying the uterus under deep anesthesia, by some method that is rapid and that will cause as little injury to the woman as possible.

9. *To prevent ophthalmia neonatorum*: Whenever there is the possibility of infection, or in every case, wash the eyelids of the newborn child with clean warm water, and drop on the cornea of each eye one drop of a one or two per cent. solution of nitrate of silver, immediately after birth.

SPECIAL PRACTICE

1. The history of a case should include: The date; name, address, age, occupation, and civil condition of the patient. Inquiry should then be made regarding the parents, brothers, sisters, and children of the patient; their health, or age and cause of death. Then the pre-

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vious illnesses or accidents from which the patient has suffered, and finally the present illness must be inquired into. With regard to the latter, note date of origin, manner of origin, the order in which the symptoms appeared, and the chief symptoms which trouble the patient now and for which he seeks relief. The patient should also be questioned about his appetite, frequency of bowel movements, sleep, loss of weight, ability to work, etc.

2. In *appendicitis* the pain and tenderness are in the right iliac fossa; there is rigidity of the right rectus muscle; there are fever and gastrointestinal disturbances, but no jaundice or tenderness of liver and gall-bladder.

In *biliary colic* the pain is in the right hypochondriac region; there is no rigidity of the right rectus muscle; there are chills, slight fever, sweats, perhaps syncope, and vomiting; the liver and gall-bladder are tender and swollen, and there may be jaundice.

3. Some of the conditions which cause children to sleep with mouth open: Adenoids, hypertrophy of tonsils, retropharyngeal abscess, any obstruction of the nasal passages.

4. *Aphonia* is a symptom, and not a disease.

It may be caused by: Laryngitis, edema of the glottis, tumor of larynx, excessive or improper use of the voice, retropharyngeal abscess, paralysis of the adductor muscles of the larynx, involvement of the laryngeal nerves, fixation of the vocal cords by cicatricial contractions, ulceration of the vocal cords, foreign bodies in the larynx, and hysteria.

7. Some of the symptoms of *eyestrain* are: Headache, nausea, vomiting, heartburn, anorexia, dyspepsia, constipation, insomnia, nightmare, neurasthenia, chorea.

8. Some of the causes of *impaired hearing* are: (1) Aural polypi, (2) inflammation of the membrane lining the Eustachian tubes, (3) inflammation of the middle ear, (4) inflammation of the internal ear, (5) disease of the auditory nerve, (6) perforation of the membrana tympani, (7) parotitis, (8) diseases of the throat, blocking up the end of the Eustachian tube, (9) certain drugs, as salicylic acid, quinine, etc., (10) impacted cerumen.

The distinction between ordinary deafness and the nervous form is made by testing with watch or tuning fork. "If the ticking of a watch or the vibrations of a tuning fork are heard faintly or not at all when held at varying distances from the ear (aërial conduction), but become distinctly audible when the watch or the handle of the fork is placed in contact with the skull or mastoid process (bone conduction), the deafness is of the ordinary variety and due to aural disease. If, on the other hand, watch and fork are heard indistinctly or not at all, both

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in contact and at a distance, the deafness is due to some lesion of the nerve or its connections. In the first case the nerve is normal and can appreciate vibrations brought by the bone, while, through some fault in the mechanism, aerial vibrations are not transmitted to the nerve endings. In the second case the nerve is at fault and cannot appreciate vibrations, no matter how well they may be conducted."—Butler's *Diagnostics of Internal Medicine*.

STATE BOARD EXAMINATION QUESTIONS.

WISCONSIN BOARD OF MEDICAL EXAMINERS.

OBSTETRICS.

1. Name the external and internal female organs of generation and describe the uterus.
2. Name the positive signs of pregnancy and at what time they can be recognized. Name the doubtful signs.
3. Name and describe the different stages of normal labor and your management in each stage.
4. Differentiate ascites, ovarian cyst, and pregnancy before the fifth month.
5. Give symptoms and treatment of albuminuria of pregnancy, and treatment of eclampsia.
6. State the danger of a prolapsed funis and give treatment.
7. Name the causes of antepartum and postpartum hemorrhage. Give treatment of each.
8. What are the indications for the use of the forceps? Give rules for applying them.

GYNECOLOGY.

1. Give causes, symptoms, physical signs, and treatment of cervical endometritis.
2. Give etiology, symptoms, physical signs, and treatment of pelvic cellulitis.
3. Define ectopic gestation, name varieties, give diagnosis, prognosis, and treatment.
4. Give etiology, prognosis, and treatment of membranous dysmenorrhea.

SURGERY, LARYNGOLOGY, OPHTHALMOLOGY.

1. Define acute bursitis and synovitis and give treatments.
2. Describe Bassini's operation for the radical cure of inguinal hernia.

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3. Define Raynaud's disease and noma and give treatments.
4. Define tumors, name varieties, and give prognoses and general treatment.
5. Name varieties of bone diseases and give treatment of osteomyelitis.
6. Define a fracture and give the treatment for a fractured patella.
7. Define a dislocation and name and give treatment of elbow varieties.
8. Define actinomycosis and tetanus and give treatments.
9. Define perichondritis and chondritis and give etiology and treatment.
10. Describe operations of intubation and tracheotomy and tell when indicated.
11. Define ophthalmia neonatorum and give treatment.
12. Define trachoma and give etiology and treatment.
13. Define iritis and keratitis and give etiology and treatments.

HISTOLOGY, BACTERIOLOGY, AND PATHOLOGY.

1. (a) Name the fundamental groups of tissues and give an example of each. (b) Describe the stages in cytomorphosis. (c) Give differential diagnosis of a section of stomach, duodenum, ileum, and colon.
2. (a) Describe minutely the intima of a medium sized artery. (b) Describe the mucous membrane of the bladder. (c) By diagram show the normal histology of a lobule of the lung.
3. (a) Stain for tubercle bacillus in sputum and give two other bacteria that behave similarly to the stain. (b) By culture differentiate *Bacillus typhosus* from *Bacillus coli communis*.
4. (a) Name four pus-producing bacteria. (b) Describe and explain the Widal phenomena. (c) How would you demonstrate gonococci in a urethral discharge?
5. Give the gross and microscopic appearances in fatty degeneration of the heart.
6. Give the reasons for the following phenomena in inflammation: (a) The decreased velocity of the blood. (b) The formation of border zones.
7. Explain how infarcts are formed and tell where they may be found in the body.
8. Give the steps in the formation of a thrombus, describe its organization; where will it not organize?
9. Classify neoplasms of epithelial origin and describe one.

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GYNECOLOGY.

3. Ectopic gestation is a pregnancy in which the ovum is developed outside of the uterine cavity.

Varieties.—Ovarian, tubal, interstitial, abdominal.

Diagnosis.—"When extrauterine pregnancy exists there are: (1) The general and reflex symptoms of pregnancy; they have often come on after an uncertain period of sterility; nausea and vomiting appear aggravated. (2) Then comes a disordered menstruation, especially metrorrhagia, accompanied with gushes of blood, and with pelvic pain coincident with the above symptoms of pregnancy; pains are often very severe, with marked tenderness within the pelvis; such symptoms are highly suggestive. (3) There is the presence of a pelvic tumor characterized as a tense cyst, sensitive to the touch, actively pulsating; this tumor has a steady and progressive growth. In the first two months it has the size of a pigeon's egg; in the third month it has the size of a hen's egg; in the fourth month it has the size of two fists. (4) The os uteri is patulous; the uterus is displaced, but is slightly enlarged and empty. (5) Symptoms No. 2 may be absent until the end of the third month, when suddenly they become severe, with spasmodic pains, followed by the general symptoms of collapse. (6) Expulsion of the decidua, in part or whole. Nos. 1 and 2 are *presumptive signs*; Nos. 3 and 4 are *probable signs*; Nos. 5 and 6 are *positive signs*." (*American Text-Book of Obstetrics*.)

Prognosis.—All forms of ectopic gestation are exceedingly dangerous.

Treatment consists in the removal of the product of conception, by a laparotomy, as soon as the diagnosis is made.

4. MEMBRANOUS DYSMENORRHEA. *Etiology.*—Interstitial endometritis.

Prognosis is not so good as in the other forms; as the condition is obstinate, the prognosis must be guarded.

Treatment consists in curettage, which may have to be repeated (perhaps more than once) before a cure is effected.

SURGERY, LARYNGOLOGY, OPHTHALMOLOGY.

II. Ophthalmia neonatorum is an infectious, purulent inflammation of the conjunctiva in the newborn, due to the gonococcus or other pyogenic germ; produced by contact of the eye with the vaginal secretion of the mother during labor, or infected fingers, or instruments, etc.

The treatment is (1) *Prophylactic.*—Whenever there is the possibility of infection, or in every case, wash the eyelids of the newborn child with clean warm water, and drop on the cornea of each eye one drop of a one or two per

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cent. solution of nitrate of silver, immediately after birth. (2) *Remedial*.—Wash the eyes carefully every half hour with a saturated solution of boric acid; pus must not be allowed to accumulate. Two drops of a two per cent. solution of nitrate of silver must also be dropped on to the cornea every night and morning. The eyes must be covered with a light, cold, wet compress. The patient must be isolated, and all cloths and compresses used must be burnt.

12. *Trachoma* is an inflammatory condition of the conjunctiva, accompanied by hypertrophy, granule formation, and subsequent cicatricial changes.

Etiology.—It is caused by contagion from another eye, being transferred by means of the secretion.

Treatment "consists in an attempt to reduce the inflammatory symptoms and secretion, and to check and remove hypertrophy of the conjunctiva, thus shortening the duration and diminishing the liability to conjunctival cicatrization and to sequelæ. This is accomplished either by the use of certain irritating applications, or by mechanical (surgical) means.

Irritating Applications.—Sulphate of copper in the form of a crystal or pencil is the favorite local application. Nitrate of silver (one or two per cent. solution), glycerole of tannin (five to twenty-five per cent.), and the alum stick are also employed.

Mechanical (Surgical) Treatment includes expression, grattage, excision, curetting, electrolysis, x-rays, and galvano-cautery." (May's *Diseases of the Eye*.)

HISTOLOGY, BACTERIOLOGY, AND PATHOLOGY.

3. (a) The sputum must be recent, free from particles of food or other foreign matter; select a cheesy-looking nodule and smear it on a slide, making the smear as thin as possible. Then cover it with some carbolfuchsin, and let it steam over a small flame for about two minutes, care being taken that it does not boil. Wash it thoroughly in water and then decolorize by immersing it in a solution of any dilute mineral acid for about a minute. Then make a contrast stain with solution of Loeffler's methylene blue for about a minute; wash it again and examine with oil immersion lens. The tubercle bacilli will appear as thin red rods, while all other bacteria will appear blue.

The smegma bacillus and the bacillus of leprosy behave similarly to the stain.

(b) The cultural and microscopical points of difference between the *Bacillus coli communis* and the *Bacillus typhosus* (of Eberth) are:

"(1) The motility of the colon bacillus is, as a rule, not

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very pronounced, sometimes absent; that of the typhoid bacillus is usually very active.

"(2) On gelatine plates the colon bacillus develops more rapidly and luxuriantly than the typhoid bacillus, and on potato it grows more abundantly, being almost always visible.

"(3) The colon bacillus coagulates milk with acid reaction within twenty-four to forty-eight hours; the typhoid bacillus does not coagulate milk.

"(4) The colon bacillus causes fermentation with production of gas in media containing sugar; the typhoid bacillus does not.

"(5) In nutrient agar or gelatine containing lactose and litmus tincture and of a slightly alkaline reaction, the color of the colonies of colon bacillus is pink and the surrounding medium red; while the colonies of typhoid bacillus are blue and there is little or no reddening of the medium.

"(6) The colon bacillus produces indol in cultures of bouillon or peptone; the typhoid bacillus does not.

"(7) When a twenty-four-hour-old bouillon culture of the colon bacillus is mixed with the blood or serum of a patient suffering from genuine typhoid fever, in a dilution of one to ten or more, after the first week of the disease, the Widal reaction is negative; cultures of the typhoid bacillus treated in the same manner and examined in the hanging drop give the characteristic agglutination and clumping of the bacilli." (*Reference Handbook of the Medical Sciences.*)

4. (a) *Four pus-producing bacteria: Staphylococcus pyogenes aureus, Staphylococcus pyogenes citreus, Staphylococcus pyogenes albus, and Streptococcus pyogenes.*

(b) The Widal phenomenon "depends upon the fact that serum from the blood of one ill with typhoid fever, mixed with a recent culture, will cause the typhoid bacilli to lose their mobility and gather in groups, the whole called 'clumping.' Three drops of blood are taken from the well-washed aseptic finger tip or lobe of the ear, and each lies by itself on a sterile slide, passed through a flame and cooled just before use; this slide may be wrapped in cotton and transported for examination at the laboratory. Here one drop is mixed with a large drop of sterile water, to redissolve it. A drop from the summit of this is then mixed with six drops of fresh broth culture of the bacillus (not over twenty-four hours old) on a sterile slide. From this a small drop of mingled culture and blood is placed in the middle of a sterile cover-glass, and this is inverted over a sterile hollow-ground slide and examined. A positive reaction is obtained when all the bacilli present gather

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in one or two masses or clumps, and cease their rapid movement inside of twenty minutes." (From Thayer's *Pathology*.)

(c) To demonstrate *gonococci* in a urethral discharge.—On a cover-glass make a smear with the discharge as thin as possible, and let it dry in the air; cover it with a freshly-made solution of anilin-oil-gentian-violet for one or two minutes; wash it in distilled water; leave it in Gram's solution for two minutes; wash it in 95 per cent. alcohol until decolorized; wash it in distilled water; counterstain with a dilute carbol-fuchsin without heat, or with a saturated aqueous solution of Bismarck brown; wash in distilled water, dry with filter paper, mount, and examine with an oil-immersion lens. The *gonococci* will appear as *diplococci within the leucocytes*, which have been decolorized by Gram's stain, and have taken the counterstain.

6. (a) The decreased velocity of the blood, in inflammation, is probably due to some change in the vessel walls, which increases the friction.

NEUROLOGY.

1. The ganglia connected with the fifth pair of cranial nerves are: (1) The Gasserian; (2) the ophthalmic; (3) Meckel's; (4) the submaxillary; (5) the otic.

2. The *median nerve* arises by two roots, one from the outer cord, the other from the inner cord of the brachial plexus.

Its *principal branches* are the muscular, anterior interosseus, palmar cutaneous, muscular (to the thumb), and digital branches.

It is *distributed* to all the superficial muscles on the front of the forearm except the flexor carpi ulnaris; all the deep muscles on the front of the forearm except the inner half of the flexor profundus digitorum; the skin over the palm of the hand; the abductor pollicis, opponens pollicis, and the outer head of the Flexor brevis pollicis; the outer three and a half fingers, and the first and second lumbricales.

3. The trochlear nerve is the motor nerve to the superior oblique muscle of the eye. When this nerve is paralyzed the patient is unable to turn the eye outward and downward.

5. *Cerebral softening* is a degenerative process occurring in the brain as a result of occlusion of an artery and consequent local deprivation of blood-supply. This obliteration of the artery may be due to thrombosis or to embolism. The stages in the process are: Obliteration of the artery, local anemia, degeneration of tissue, necrosis, and *softening*.

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6. In *locomotor ataxia* the posterior columns and posterior nerve roots of the cord are involved.

In *progressive muscular atrophy* the ganglion cells in the anterior horns of the cord are involved.

MEDICAL JURISPRUDENCE.

1. *Abortion is justifiable*.—"(1). In pelvic deformity where there is sufficient space for a seven months' child to be delivered without injury. The object is twofold: (a) to save the child's life by obviating the necessity for craniotomy; (b) to spare the mother the dangers of craniotomy, cesarean section, symphyseotomy, or other operations that might be required if the pregnancy went to full term. (2) In cases where, in previous labors, the head of the child at full term has been prematurely ossified, or unusually large, so that labor has been difficult and dangerous, even though the pelvis were normal. The period of delivery need only be two or three weeks before 'term' in these cases. (3) In cases where the children of previous pregnancies have died *in utero* during the later weeks of gestation from disease (fatty, calcareous, or amyloid degeneration, etc.) of the placenta. (4) In conditions where the continuance of pregnancy seriously endangers the mother's life, such as: excessive vomiting; albuminuria; uremic convulsions, or paralysis; chorea; mania; organic disease of the heart, lungs, liver, bloodvessels, etc., threatening fatal disturbance of the respiration, circulation, and other vital functions; irreducible displacements of uterus; placenta previa with hemorrhage; and in dangerous pressure upon neighboring organs from over-distention of uterus, due to dropsy of amnion, tumors, multiple pregnancy, etc." (King's *Manual of Obstetrics*.)

2. Malpractice is a failure on the part of a medical practitioner to use such skill, care, and judgment in the treatment of a patient as the law requires; and thereby the patient suffers damage. If due to negligence only, it is *civil malpractice*. But if done deliberately, or wrongfully, or if gross carelessness or neglect have been shown, or if some illegal operation (such as criminal abortion) be performed, it is *criminal malpractice*.

3. In *expert testimony*, the witness may give his *opinion* on facts or supposed facts as noted by himself or asserted by others. *Theoretically*, this can be done only by those perfectly familiar with the subject in question; but *practically* any (or almost any) physician with a license to practise is accepted as an expert witness.

In *ordinary testimony*, the witness testifies only to *facts* which he has seen, or heard, or with which he has become acquainted by personal observation.

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PEDIATRICS.

1. Cases of infantile convulsions are: "Overeating, especially of indigestible food; rachitis, debility from exhausting diarrheal diseases; high fever, especially at the onset of the acute specific infections; very seldom dentition, phimosi, and acute middle-ear inflammation; injuries to the brain at birth, infantile hemiplegia, meningitis, and tumor of the brain; rarely of spinal cord disease."—(From Butler's *Diagnostics of Internal Medicine*.)

3. Spina bifida is a condition in which there is a cleft in part of the posterior wall of the spinal cord; it is due to imperfect development. Through this cleft there may protrude the spinal meninges and cerebrospinal fluid (meningocele); or it may contain in addition some of the cord and nerves (meningomyelocele); or there may be great distention of the central canal, the sac-wall being formed of the thinned cord (syringomyelocele).

MATERIA MEDICA AND THERAPEUTICS.

1. *IPECAC.* *Source.*—The dried root and part of the stem of the *Cephaelis ipecacuanha* or of the *Cephaelis acuminata*.

Composition.—Emetine, Cephaeline, another (unnamed) alkaloid, Cephaelic or Ipecacuanhic acid, Tannic acid, volatile oil, etc.

Preparations.—Fluidextractum Ipecacuanhæ, Syrupus Ipecacuanhæ, Vinum Ipecacuanhæ, Pulvis Ipecacuanhæ et Opii, Tinctura Ipecacuanhæ et Opii.

2. *Agents which affect the organ of vision when locally applied.*—*Mydriatics* (dilate the pupil): Atropine, Homatropine, Daturine, Hyoscyamine, Coniine, Cocaine; and probably Gelsemine, Muscarine, Hydrocyanic acid, Aconite, and Amyl nitrite.

Myotics (contract the pupil): Pilocarpine, Physostigmine, and probably Nicotine.

Dilators of the pupils, especially atropine and homatropine, are used to dilate the pupil for ophthalmoscopic examination, and to prevent or break down adhesions of the iris. Contractors of the pupil, especially physostigmine, are used to overcome the effects of atropine, to prevent or break down adhesions of the iris, and to prevent too much light entering the eye in painful diseases of it.

Drugs which impair or paralyze accommodation.—Atropine, Daturine, Hyoscyamine, Homatropine, Cocaine, Physostigmine, Pilocarpine, Gelsemine, and Coniine.

Intraocular tension is increased by atropine (large doses), hyoscyamine, and daturine. It is decreased by cocaine, hyoscine, and physostigmine.

Gelsemine paralyzes the external ocular muscles, es-

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pecially the levator palpebræ and the external rectus, by its action on the terminal nerve filaments.

Cocaine, by stimulating the unstriated fibers in the orbital membrane and the eyelids, causes the eye to protrude. Coniine produces ptosis when given in large doses. (From White and Wilcox's *Materia Medica*, etc.)

4. *Escharotics* are agents which, on being applied to a tissue, destroy it, and produce a slough. Examples: Mineral acids, caustic alkalies, zinc chloride, zinc sulphate, silver nitrate, mercuric chloride, mercuric nitrate, bromine, and the cautery.

Astringents are agents which diminish secretion from mucous surfaces and cause tissues to contract. Examples: Acids (especially gallic and tannic), alum, galls, kino, ferric chloride, copper sulphate, bismuth subnitrate, lead acetate, silver nitrate, zinc sulphate.

Styptics are agents which, on being applied locally, arrest hemorrhage. Examples: The cautery, acids, nitrate of silver, alum, collodion, and vegetable astringents.

Emollients are substances which tend to soften, relax, and protect the parts to which they are applied. Examples: Cold cream, cacao butter, olive oil, glycerin, lanolin, paraffin, vaseline, lard.

5. There are only two officinal digestive ferments: (1) *Pepsin*, obtained from the fresh stomach of the hog. In an acid medium it digests the proteid constituents of the food, and converts them into albumoses and peptones. (2) *Pancreatin*, obtained from the fresh pancreas of the hog or other warm-blooded animal. In an alkaline medium it converts the proteid constituents of the food into peptones, converts starches into sugars, and (when recent) emulsifies fats; it may also coagulate milk.

6. In *poisoning by iodine*, large quantities of starch should be given as the antidote; emetics and the stomach tube are also indicated; the body should be kept warm, and hypodermic injections of alcohol, digitalis, and strychnine may be required to maintain the circulation and respiration.

CHEMISTRY, TOXICOLOGY, URANALYSIS.

1. *An alkaloid* is an organic nitrogenized substance of alkaline reaction and capable of combining with acids to form salts in the same way that ammonia does.

2. *A chemical radical* is a group of atoms capable of passing unaltered from one compound to another, like a single atom.

3. *Acids* are compounds of an electronegative element or radical with hydrogen, part or all of which hydrogen they can part with in exchange for an electropositive ele-

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ment, without formation of a base. *Examples:* Sulphuric acid, H_2SO_4 ; nitric acid, HNO_3 .

Bases are ternary compounds capable of entering into double decomposition with an acid to produce a salt and water. *Examples:* Potassium hydroxide, KOH ; Calcium hydroxide, $\text{Ca}(\text{OH})_2$.

Salts are substances formed by the substitution of an electropositive element for part or all of the replaceable hydrogen of an acid. *Examples:* Sodium nitrate, NaNO_3 ; Monopotassic sulphate, KHSO_4 .

4. *Nitric acid*, HNO_3 . It is used externally as a caustic on chancres, chancroids; also on warts, phagedenic ulcers, indolent ulcers, and gangrene. Internally it is used as a tonic, in gastric or intestinal indigestion, and summer diarrhea of children.

Hydrochloric acid, HCl . It is used in indigestion, gastric cancer, and gastric catarrh.

5. *Hypo* prefixed to an acid or a salt denotes less oxygen than the "*ous*" acid or the "*ite*" salt.

Hyper or *Per* prefixed to an acid or a salt denotes more oxygen than the "*ic*" acid or the "*ate*" salt.

Examples:

$\text{HClO} = \text{Hypochlorous acid}$; $\text{KClO} = \text{Potassium hypochlorite}$.

$\text{HClO}_2 = \text{Chlorous acid}$; $\text{KClO}_2 = \text{Potassium chlorite}$.

$\text{HClO}_3 = \text{Chloric acid}$; $\text{KClO}_3 = \text{Potassium chlorate}$.

$\text{HClO}_4 = \text{Perchloric acid}$; $\text{KClO}_4 = \text{Potassium perchlorate}$.

6. $\text{HgCl}_2 + 2\text{KI} = \text{HgI}_2 + 2\text{KCl}$.

7. Sodium: Na .

Sodium hydroxide: NaHO . It is a white solid, hard, brittle, amorphous, soluble in water, and has a strong corrosive action; when exposed to the air it is converted into Sodium carbonate.

Sodium dioxide: Na_2O_2 . It is a white solid, amorphous.

Sodium monoxide: Na_2O . It is a grayish-white substance.

8. The symptoms of poisoning by strychnine are as follows: "Strychnine produces a sense of suffocation, thirst, tetanic spasms, usually opisthotonos, sometimes emprosthotonos, occasionally vomiting, contraction of the pupils during the spasms, and death, either by asphyxia during a paroxysm, or by exhaustion during a remission. The symptoms appear in from a few minutes to an hour after taking the poison, usually in less than twenty minutes; and death in from five minutes to six hours, usually within two hours.

Treatment: "The convulsions are to be arrested or mitigated by bringing the patient under the influence of chloral or chloroform as rapidly as possible; the stomach is to be

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washed out, and the patient is to be kept as quiet as possible." (Witthaus' *Essentials of Chemistry*.)

9. The most common sources of lead poisoning are the following:

"The contamination of drinking water from lead pipes. Contamination of articles of food or drugs by contact with leaden vessels, or from being enclosed in tinfoil containing an excess of lead. Drinking beer, cider, etc., which has been drawn through leaden pipes or allowed to stand in pewter vessels. The ingestion or constant handling of lead or its compounds, as the acetate, nitrate, carbonate (white lead—painter's colic), Goulard's extract, etc. The use of hair dyes containing lead."

The symptoms are: "Metallic taste; dryness of the throat; thirst; severe colicky abdominal pains, referred particularly to the umbilical region, and relieved by pressure; pulse very feeble and slow; great prostration; constipation; urine scanty and red; violent cramps; paralysis of the lower extremities; convulsions; and tetanic spasms."

The treatment consists in removing the cause and administering the antidote, "magnesium sulphate, which brings about the formation of the insoluble lead sulphate, while the purgative action of the magnesia is also useful. It should be preceded by an emetic, or by the use of the stomach tube." (Witthaus' *Essentials of Chemistry*.)

10. The characteristic symptoms of poisoning by corrosive sublimate are: A burning pain in the mouth, pharynx, and stomach; the mouth and tongue are white; the vomitus is white, with shreds of mucous membrane, and tinged with blood; bloody stools, also salivation may occur.

Treatment: The antidote is white of egg, but too much must not be given at one time; this should be followed by an emetic.

12. Test for albumin: The urine must be perfectly clear. If not so, it is to be filtered, and if this does not render it transparent it is to be treated with a few drops of magnesia mixture, and again filtered. The reaction is then observed. If it be acid, the urine is simply heated to near the boiling point. If the urine be neutral, or alkaline, it is rendered faintly acid by the addition of dilute acetic acid; and heated. If albumin be present, a coagulum is formed, varying in quantity from a faint cloudiness to entire solidification, according to the quantity of albumin present. The coagulum is not redissolved upon the addition of HNO_3 .

Test for sugar: Render the urine strongly alkaline by addition of Na_2CO_3 . Divide about 6 c.c. of the alkaline liquid in two test tubes. To one test tube add a very minute quantity of powdered subnitrate of bismuth, to the other as much powdered litharge. Boil the contents of

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both tubes. The presence of glucose is indicated by a dark or black color of the bismuth powder, the litharge retaining its natural color.

Quantitative test for urea: A comparatively easy test is that of Fowler, based upon the loss of the specific gravity of the urine after the decomposition of the urea by hypochlorite. "To apply this method the specific gravity of the urine is carefully determined, as well as that of the liquor sodæ chlorinatæ (Squibb's). One volume of the urine is then mixed with exactly seven volumes of the liquor sodæ chlorinatæ, and, after the first violence of the reaction has subsided, the mixture is shaken from time to time during an hour, when the decomposition is complete; the specific gravity of the mixture is then determined. As the reaction begins instantaneously when the urine and reagent are mixed, the specific gravity of the mixture must be calculated by adding together once the specific gravity of the urine and seven times the specific gravity of the liquor sodæ chlorinatæ, and dividing the sum by eight. From the quotient so obtained the specific gravity of the mixture after decomposition is subtracted; every degree of loss in specific gravity indicates 0.7791 gram of urea in 100 c.c. of urine. The specific gravity determinations must all be made at the same temperature; and that of the mixture only when the evolution of gas has ceased entirely." (Witthaus' *Manual of Chemistry*.)

PHYSIOLOGY, HYGIENE, AND PHYSICAL DIAGNOSIS.

1. *Functions of the pneumogastric nerve:* "Throughout its whole course the vagus contains both sensory and motor fibers. To summarize the many functions of this nerve . . . it may be said that it supplies (1) *motor* influence to the pharynx and esophagus, stomach, and intestines, to the larynx, trachea, bronchi, and lungs; (2) *sensory* and, in part, (3) *vasomotor* influence, to the same regions; (4) *inhibitory* influence to the heart; (5) *inhibitory* afferent impulses to the *vasomotor center*; (6) *excito-secretory* to the salivary glands; (7) *excito-motor* in coughing, vomiting, etc." (Kirke's *Physiology*.)

4. Too little food decreases both the quantity of milk and the percentage of solids. An ample diet increases both the quantity of milk and the percentage of solids. Abundance of proteids in the food increases the fat in the milk; so also does fat in the food, if it is well digested. Watery food increases the amount of milk, but diminishes the percentage of solids.

6. The *functions of the medulla oblongata* are: (1) It is a conductor of nervous impulses or impressions from the cord to the cerebrum, from the brain to the spinal cord,

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also of coordinating impulses from the cerebellum to the cord; (2) it contains collections of gray matter which serve as special nerve centers for the following functions or actions; respiration, salivary secretion, mastication, sucking, deglutition, speech production, facial expression; it also contains the cardiac and vasomotor centers.

7. (a) The *function of the thyroid* is not definitely settled; (1) it has some trophic function; (2) it is supposed to antagonize toxic substances; (3) it produces an internal secretion.

(b) Removal of the thyroid causes mental and bodily dullness and apathy, tremors, twitchings, overgrowth of the connective tissues, and development of fat; the hairs fall out, and the patient becomes unwieldy and clumsy in both body and mind. Complete removal causes death in most animals, and it is not considered justifiable in man.

10. In *hepatic colic* the pain is in the right hypochondriac region; there is no rigidity of the right rectus muscle; there are chills, slight fever, sweats, perhaps syncope, and vomiting; the liver and gall-bladder are tender and swollen, and there may be jaundice.

In *appendicitis* the pain and tenderness are in the right iliac fossa; there is rigidity of the right rectus muscle; there are fever and gastrointestinal disturbances, but no jaundice or tenderness of liver and gall-bladder.

11. In cardiac hypertrophy affecting the *left ventricle*: The apex beat is lower than normal and also further to the left, but not so far to the left as when the right ventricle is hypertrophied; the area of pulsation is increased, and there may be a systolic retraction of the inter-spaces; the area of cardiac dullness is increased downwards and to the left; the first sound is long and low-pitched; the second sound (at the apex) is louder and sharper.

In cardiac hypertrophy affecting the *right ventricle*: The apex beat is lower than normal and much further to the left; percussion shows the transverse diameter of the heart to be very much enlarged; the second pulmonic sound is much accentuated, and at times may be observed by palpation.

12. (a) *Cerebral hemorrhage* is generally preceded by vertigo, headache, tinnitus aurium, numbness, loss of memory, dreams, or disturbed sleep. The attack comes on suddenly, with vertigo and unconsciousness; the face is flushed; breathing is stertorous, and later may become of the Cheyne-Stokes type; the temperature is subnormal, but later may rise; there may be incontinence of urine and feces; signs of paralysis are evident; the pupils are unequal. The case is to be diagnosed from acute softening

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of the brain, from embolus or thrombus, also from the coma of uremia, opium, epilepsy, or alcohol.

(b) The most reliable signs of death are: Complete and permanent cessation of circulation and respiration; loss of body heat; rigor mortis; pallor of the body; a bright needle on being plunged into a muscle and left there, on being withdrawn shows no sign of oxidation; on the hand being held before a strong light, with the fingers extended and together, there is no translucence; the eye is not responsive to light or mydriatics, and there is loss of corneal transparency; putrefaction.

PRINCIPLES AND PRACTICE.

2. Spinal sclerosis is a condition of hardening produced by inflammation and accompanied by increase and proliferation of the supporting connective tissue, and atrophy of the nerve elements.

The varieties (as given by Dana) are:

Spinal sclerosis	{ Primary and degenerative	Posterior spinal sclerosis (locomotor ataxia).
		Lateral sclerosis.
		Combined sclerosis.
		Progressive muscular atrophy; amyotrophic lateral sclerosis.
	{ Secondary	Ascending and descending degenerations.
		Chronic myelitis and sclerosis following destruction of cord.
		Multiple sclerosis.

4. The feces may be examined *microscopically* for: The *Ameba coli* in dysentery; the *Spirillum* of cholera; the *Bacillus typhosus* in typhoid fever; the *Tania solium*; the *Oxyuris vermicularis*, and other parasites and bacteria. Chemical examination might show the presence of mucin, blood, albumin, peptones, and bile pigment. *Spectroscopic* examination might possibly show the presence of blood.

5. *Hemiplegia* may be caused by: Lesions of the cortex cerebri, corona radiata, internal capsule, corpus striatum, optic thalamus, crura cerebri, pons, or medulla.

6. *Autointoxication* is the condition in which a person is (being) poisoned by the reabsorption of the waste products of his own metabolism, which should have been excreted. The source of the toxins producing this condition is the body of the person so suffering.

8. The *etiology of tuberculosis* is the bacillus tuberculosis of Koch.

Suitable preventive measures would include: Careful

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disinfection or burning of sputum, etc.; avoidance of spitting in public places; plenty of fresh air and sunlight; an abundance of good and easily digested food; the proper inspection of food supplies; the avoidance of kissing; and reporting of cases to the proper health authorities, and co-operation with them.

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In the following table the State requiring of the candidate both a diploma from a recognized college and an examination are printed in roman; those requiring either a diploma or an examination, in italics; those requiring an examination only, in small capitals.

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DEPARTMENT OF PEDIATRICS

**EDITED BY
THOMAS S. SOUTHWORTH, M.D.**

Attending Physician Nursery and Childs Hospital- New York City Childrens Hospital (Randalls Island); The Hospital for Scarlet Fever and Diphtheria Patients; Physician Out-Patient Department, Babies Hospital; Member, American Pediatric Society, American Medical Association, New York Academy of Medicine.

**WILLIAM WOOD & COMPANY
PUBLISHERS**

Entered as second-class matter Jan. 3, 1893, at the Post Office at York, Pa., under the Act of Congress of March 3, 1879.

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